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dental abstracts

a selection of world dental literature

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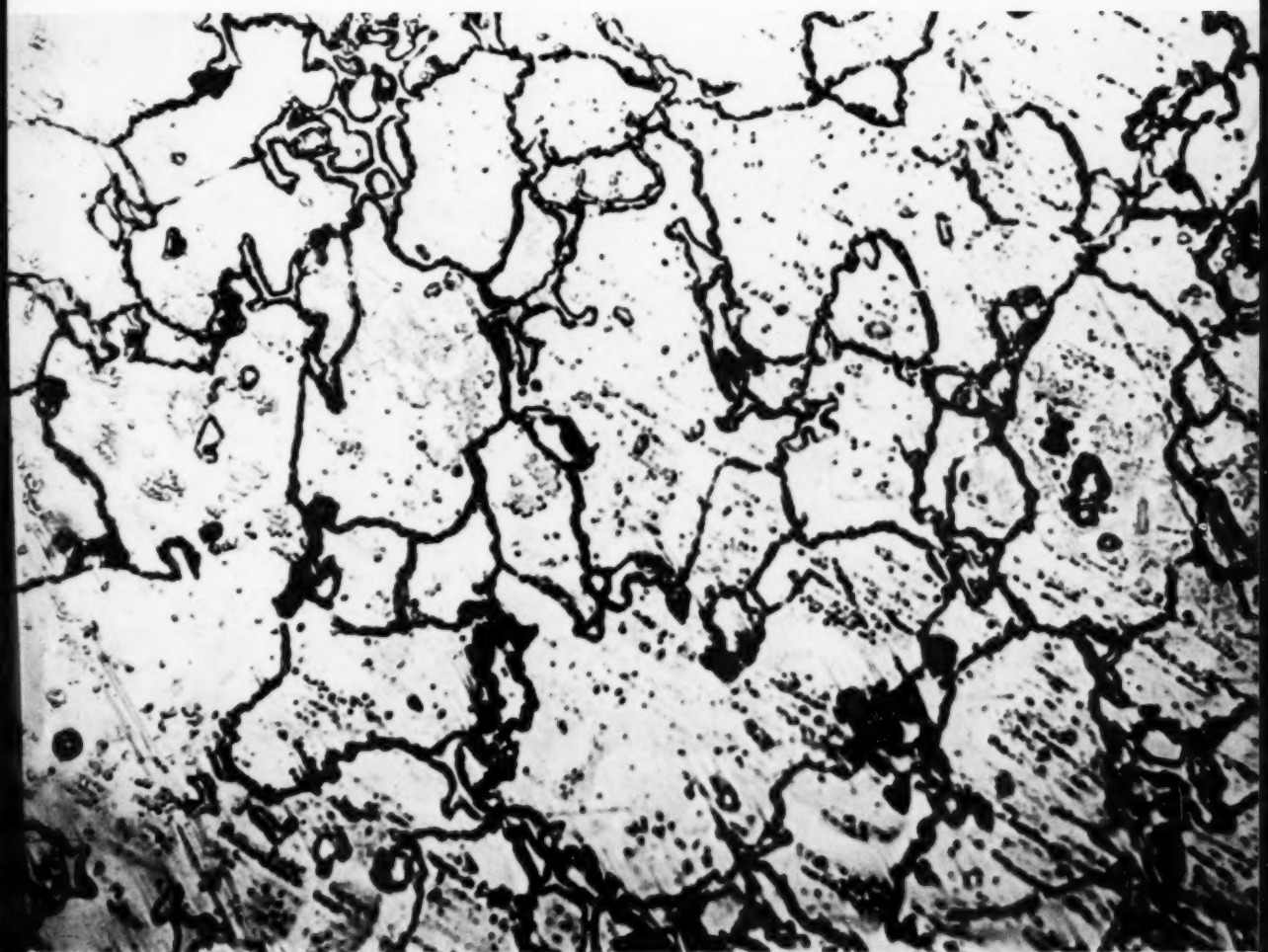

DECEMBER 1961 • VOLUME 6 • NUMBER 12

FRONT COVER: Microstructure of Stellite 21, depicting continuous carbides in the form of grain boundaries. See article on page 707

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news and notes

Norman Trieger, editor of the *Harvard Dental Alumni Bulletin,* writes: "I would like to compliment you on the recent over-all improvement and change in format of DENTAL ABSTRACTS. The magazine has certainly progressed. May I suggest that the feasibility of incorporating a reviewer's critical comment to be included with each abstract, be entertained. I felt that your addition of Dr. Dewel's comments on Dr. Halliday's article should serve as a guide to other similar, although probably briefer, comments. In this way, DENTAL ABSTRACTS may function as a constructively critical podium for evaluation of newer information in our field. . . . In most cases a critique would add immeasurably to the value of the abstract. It would also serve to advise the writer that he should take pains and be wary of the caliber of his reporting.

"To offer an illustration, the August 1961 issue of DENTAL ABSTRACTS on page 480 has an abstract of an article by H. J. Roberts on control of bleeding after dental extraction during anticoagulant therapy. Dr. Roberts is recommending the efficacy of estrogens to control bleeding in patients on long-term anticoagulant therapy, undergoing extraction of teeth. Critique: Only nine patients were studied. There was no control group, and no effort made to standardize the experiment. The author reported: 'Generally the anticoagulant . . . was omitted for three to five days preceding surgery.' Within this period, prothrombin time in all patients would have returned to normal levels, and no abnormal bleeding would have occurred with or without the use of estrogens.

"Fortunately, the abstract which followed discussed management of the same problem in a much more scientific manner; I am gratified that THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION published this original article by Behrman and Wright, and that DENTAL ABSTRACTS abstracted it."

John H. Mosteller, Mobile, Ala., writes: "Congratulations on the new look of DENTAL ABSTRACTS. I enjoyed the last issue very much. Your abstract of a paper by Duncan McConnell on "Compressive strength of reinforced silicate cement" (August, p. 474) stated: "It seems probable that any enhancement of the compressive strength of silicate cement is likely to result from the incorporation of glass fibers." This, of course, should have read "improbable," which the reader should be able to recognize from reading the preceding sentence.

"Many clinicians refer to the material added to the silicate as Fiberglass, which of course it is not. They are glass fibers but the manufacturers of these fibers will tell you themselves that in order for this material to impart any strength the fibers must be at least 2 or 3 mm. long. The 'fibers' in silicate powder are, needless to say, slightly shorter than this. As for the addition of these 'fibers' decreasing the solubility or coefficient of expansion of the filling material to which they are added, this decrease would amount only to the amount of inert material added, which is insignificant clinically. . . . Glass fiber impregnated silicates and acrylics appear to be no better or no worse than conventional ones, so no particular harm is done in using them, but the dentist should realize this and not expect better clinical results or, more important, promise longer clinical life of the filling to his patients. Certainly they are not worth or deserving of a larger fee."

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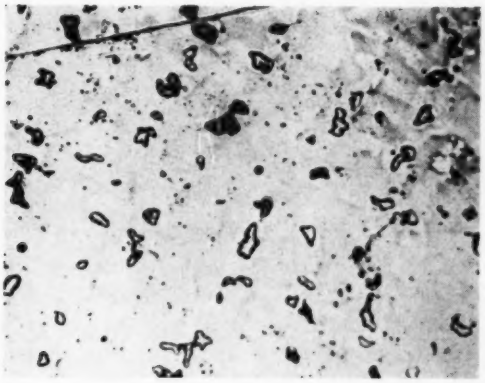
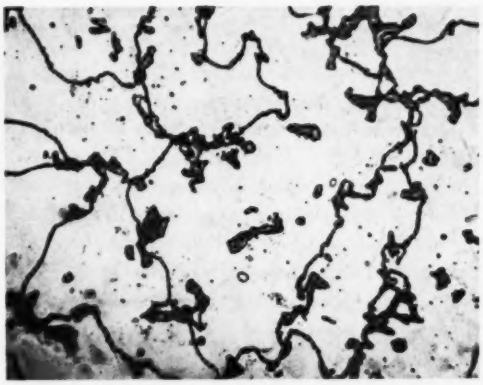




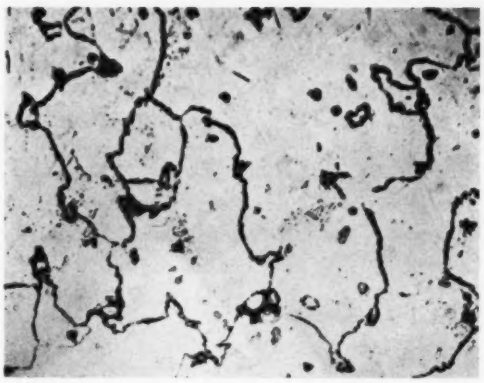


Figure 1 (Above) Microstructure of Stellite 21. Spherical and discontinuous carbides

Figure 2 (Above, right) Microstructure of Stellite 21. Dark eutectoid areas close to grain boundaries

Figure 3 (Right) Photomicrograph of a representative structure typical in a series of 20 samples

microstructure and the physical properties of cobalt-base alloys

KAMAL ASGAR AND FLOYD A. PEYTON,
ANN ARBOR, MICH.

Little is known about the microstructure of the cobalt-base alloys used in dentistry. In this study, more than 120 specimens were cast under different conditions, and their physical properties and microstructures studied. All specimens were cast of a cobalt-base alloy, Stellite 21, which is of a composition similar to a typical dental alloy. Specimen size and manner of spruing were patterned after the recommendation of the A.D.A. specification for chromium-cobalt alloys. Specimens cast under the following four conditions were studied:

1. Molten metal was heated to 2,600°F., cast into a mold with a temperature of 1,600°F., and then allowed to cool on the bench.

2. Molten metal was heated to 2,600°F., cast into a mold with a temperature of 1,300°F., and bench-cooled.

3. Molten metal was heated to 2,800°F., cast into a mold with a temperature of 1,600°F., and bench-cooled.

4. Molten metal was treated as in condition 1. The castings then were heat-treated in an oven at 1,600°F., for one hour, and quenched in water.

After the physical properties of the cast specimens were determined (reported separately),

half of each specimen was imbedded in a plastic-like material for microstructure observations.

Stellite 21 can be etched satisfactorily with a 2 per cent solution of chromic acid as an electrolyte and a low current from a 6-volt battery.

Badger and Sweeney reported (1946) that three different types of carbide can be detected in this alloy; these three types can be detected by using a very light electrolytic etch in 2 per cent chromic acid followed by an alkaline permanganate etch of about 7 seconds.

Regardless of the three types of carbides which may exist in any specimen, the microstructure of the alloy studied may represent four distinct types: (1) carbides in the form of grain boundaries and continuous in nature, as shown on the cover; (2) carbides that are spherical and discontinuous like islands, as shown in Figure 1; (3) dark eutectoid areas close to and along the grain boundaries (Fig. 2), and (4) a large percentage of these eutectoid areas, which are lamellar.

The presence or absence of any one of these four arrangements in the microstructure effects the physical properties of the alloys. For example, Figure 3 is a photomicrograph of a representative structure in a series of 20 samples. This type of structure generally showed longer elongation values, the average elongation of this group of samples being 3.4 per cent.

In order for castings of Stellite 21 alloy to have higher elongation values, they should be sound and free from microporosity and their microstructure should be of a definite type. Spherical and discontinuous types of carbides which are free from eutectoid composition and microporosities possess greater ductility and elongation. Higher metal casting temperatures result in such a microstructure.

Microstructure as well as microporosities have a pronounced effect on the physical properties of Stellite 21.

The temperature of the mold has little effect on the microstructure.

Castings made at 2,600°F. had the best surface. At a casting temperature of 2,800°F., the metal was somewhat darker and less desirable. The surface metal of the castings made at 3,000°F. was very poor and practically unacceptable, but the specimens were more ductile.

Asgar, Kamal, and Peyton, Floyd A. School of Dentistry, University of Michigan, Ann Arbor, Mich. Effect of microstructure on the physical properties of cobalt-base alloys. J.D.Res. 40:63-72 Jan.-Feb. 1961

Effect of casting conditions on some mechanical properties of cobalt-base alloys

Although there is a high demand in dentistry for cobalt-base alloys, little is known by the profession about the physical and mechanical properties of such alloys or about their basic nature. This study was undertaken to determine the physical properties of cobalt-base alloys, to relate these properties to the microstructure, and to observe the influence of casting variables on both microstructure and physical properties.

Stellite 21, a metal typical of cobalt-base alloys and closely resembling those high-melting alloys used in dentistry, was the alloy chosen for study. Since this study is basic, similar results, with minor modifications, can be expected from a study of any one of the alloys of the group designed for dental application. Stellite 21 contains the following: chromium, 27.44 per cent; molybdenum, 5.50 per cent; nickel, 2.50 per cent; manganese, 0.64 per cent; iron, 1.74 per cent; carbon, 0.25 per cent; silicon, 0.62 per cent, and the balance cobalt.

One-hundred and twenty specimens of Stellite 21 were cast under different casting conditions. The conditions were chiefly changing metal temperature, altering the mold temperature, heat-treating the test specimens, and varying the length of the specimens.

The size of the specimens was patterned after a previous study by Bush (1952). The A.D.A. Specification No. 14 for dental chromium-cobalt alloys also employs the same dimensions for tensile test samples. The test bar was 1⅝ inches long, 0.09 ± 0.01 inch in diameter, and threaded at the ends with 12-24 threads.

The following casting conditions were studied: (1) molten metal heated to 2,600°F., then cast into a mold with a temperature of 1,600°F. and allowed to cool on the bench to room temperature; (2) molten metal heated to 2,600°F., cast into a mold with a temperature of 1,300°F. and bench cooled; (3) molten metal heated to 2,800°F., then cast into a mold with a temperature of 1,600°F. and bench cooled, and (4) under

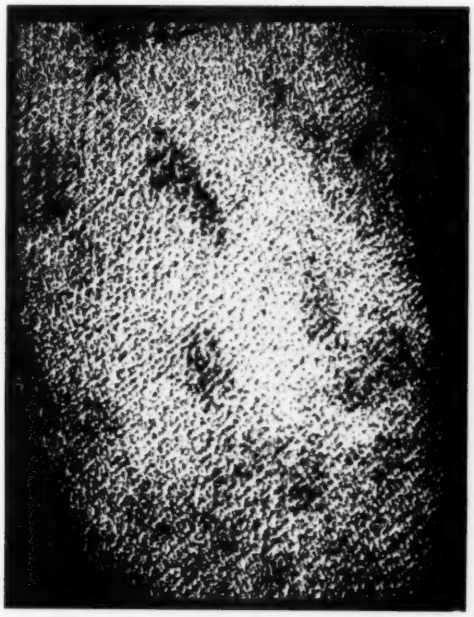


Figure 1 Microstructure of specimen 80

Figure 2 Microstructure of specimen 87

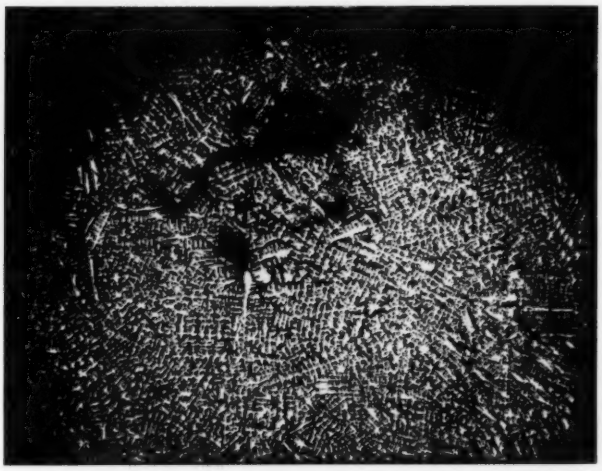


Figure 4 Microstructure of specimen 58

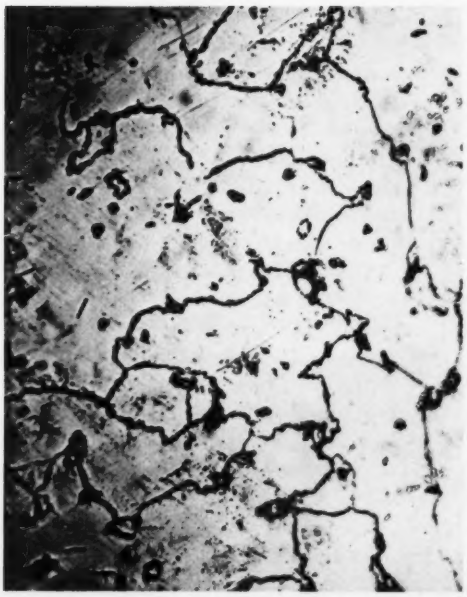


Figure 3 Microstructure of specimen 51

conditions like those of 1, the metal was heated to 2,600°F. and cast into the mold with a temperature of 1,600°F. Then the castings were heat-treated by placing them in an oven with a temperature of 1,600°F. for one hour and quenching them in water. Under each of these four conditions, 20 castings were made.

Although there was some difference in the ultimate tensile strength values obtained, ranging from about 96,000 to 107,000 pounds per square inch, no single casting condition was superior to another. Even specimens containing a small amount of microporosity had an ultimate tensile strength as high as the specimens free of microporosity. The ultimate tensile strength of Stellite 21 varied little with a change in metal casting temperature, mold temperature and the length of the specimen.

The values of 0.1 and 0.2 per cent yield strength obtained under condition 4 were somewhat lower than those obtained under other conditions. The 0.1 per cent yield strength of 75,000 pounds per square inch or higher was obtained in the other conditions, whereas the 0.1 per cent yield strength value for condition 4 averaged 69,960 pounds per square inch. The yield strength of the alloy is important in practice, since it represents the value where permanent deformation takes place in the structure. If an alloy has a high modulus of elasticity, it is not a proper alloy for partial dentures. Alloys used in partial dentures should have not only a high modulus of elasticity but also a high yield strength, so that permanent deformation of the cast piece does not take place easily. The values obtained for 0.1 per cent and 0.2 per cent yield strengths were more uniform than the ultimate tensile strength values.

The modulus of elasticity of Stellite 21 under the testing conditions of this study varied, the typical value being 35×10^6 pounds per square inch.

The presence of microporosities, as well as different types of microstructures in the specimens, had significant effects on the elongation values obtained. One of the important properties of a dental alloy is its ductility, generally indicated as a percentage of elongation. The ductility of the cast pieces is most important in burnishing the gold inlays or in adjusting the clasps of partial dentures. Both before initial insertion and after being in service for some time, partial denture clasps may need some adjustments. The ductility of the cast piece becomes important for this reason.

For high elongation values, castings of Stellite 21 alloy should be sound and free from microporosity, and their microstructure should be of a definite type, revealed by a comparison of specimens.

Both specimens 80 (Fig. 1) and 87 (Fig. 2) were cast under the same conditions and both registered an ultimate tensile strength of 97,400 pounds per square inch. The percentage of elongation of specimen 80 was 8.25 per cent, whereas that of specimen 87 was only 3.4 per cent. The microstructure of specimen 87 reveals the presence of some microporosities, whereas the microstructure of specimen 80 is free of any porosities. These findings indicate that the presence of microporosities is an important factor in elongation values.

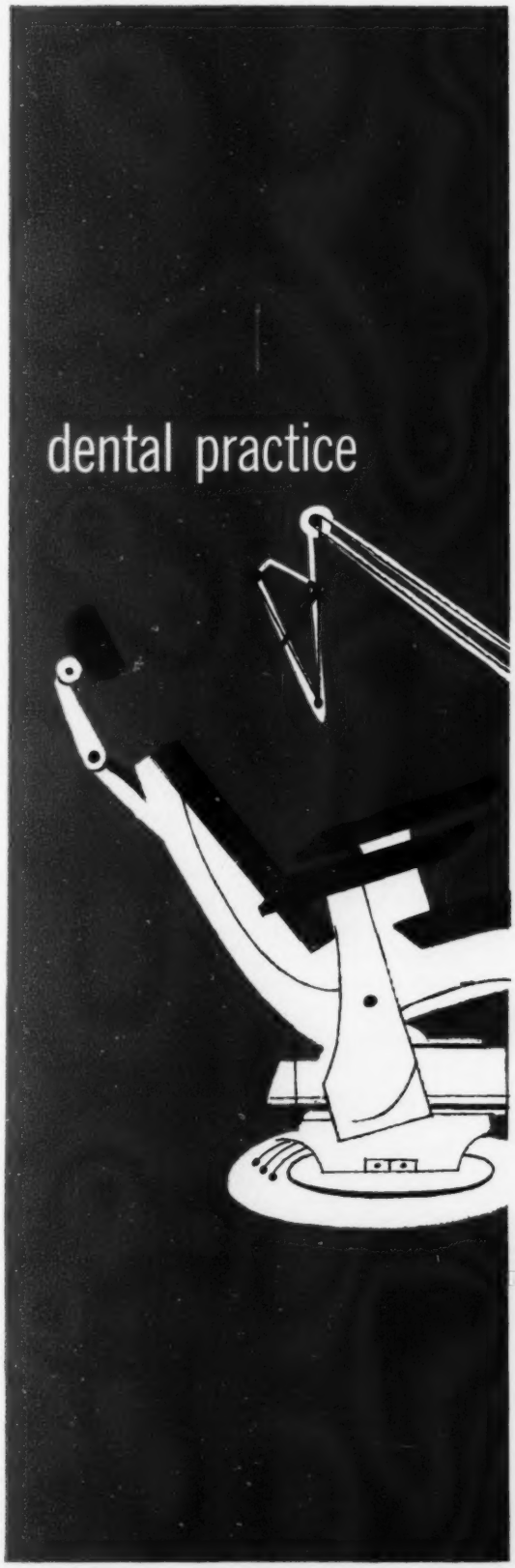
When the photomicrographs of specimens 51 (Fig. 3) and 58 (Fig. 4) are compared, it is seen that, although both specimens were cast under the same condition, they possess different microstructures. Specimen 51 has a very slight amount of microporosity and a 6.6 per cent elongation, whereas specimen 58, with no microporosity, has only 2.1 per cent elongation. This indicates that microstructure may be as significant as microporosity in modifying the properties of the alloy.

Generally, the specimens had relatively high elongation values. Specimens without microporosities showed as much as 12 per cent elongation, and the specimens with microporosities showed over 3 per cent elongation.

Specimens with metal casting temperatures of 2,800°F. and 3,000°F. yielded a higher per cent of elongation than specimens subjected to lower casting temperature. At a casting temperature of 3,000°F., however, the interphase reaction between the surface of the metal and the investment increased considerably; as a result, the surfaces of the cast pieces were damaged.

The chosen heat-treating cycle did not improve any of the properties of the alloy and possibly harmed them. The surface appearance of the heat-treated pieces was inferior.

Asgar, Kamal, and Peyton, Floyd A. School of Dentistry, University of Michigan, Ann Arbor, Mich. Effect of casting conditions on some mechanical properties of cobalt-base alloys. J.D.Res. 40:73-86 Jan.-Feb. 1961



Anesthesia

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Anesthesia

Ataraxic drugs in preanesthetic medication

Seven phenothiazine derivatives and one diphenylmethane derivative were studied as adjuvants to preanesthetic medication, together with placebos, in a double-blind study in 1,852 patients ranging in age from 12 to 95 years. All drugs were administered intramuscularly two hours prior to operation. One hour before operation, the patients received meperidine hydrochloride (12.5 to 50 mg.) and atropine (0.4 to 0.2 mg.) intramuscularly. The dosages were as follows: placebo, 0.5 to 2.0 ml.; pipamazine, 2.5 to 10 mg.; meperidine, 25 to 100 mg.; trimeprazine, 12.5 to 50 mg.; hydroxyzine, 12.5 to 50 mg.; promethazine, 12.5 to 50 mg.; perphenazine, 2.5 to 10 mg.; chlorpromazine, 12.5 to 50 mg.; trifluprazine, 10 to 40 mg.; fluphenazine (B), 0.6 to 2.5 mg., and fluphenazine (A), 1.25 to 5 mg. Patients were observed both preoperatively and postoperatively, and the effects of the drugs evaluated.

A significantly greater percentage of patients was sedated adequately by trimeprazine, perphenazine and chlorpromazine, than by meperidine, the control drug. Hypotension with these drugs was the same as that noted with the control drug, meperidine.

A reduction in postoperative nausea and vomiting was associated with tranquilizer-supplemented premedication. The reduction in nausea and vomiting appeared to be related to the reduction in preoperative narcotic dose made possible by the use of tranquilizers in premedication.

The average postanesthetic reaction time for standard premedication and cyclopropane was about 45 to 60 minutes. Promethazine, hydroxyzine and fluphenazine supplementation affected this time minimally. The remaining drugs extended the reaction time to a range of 90 minutes with perphenazine and trimeprazine, and 120 minutes with chlorpromazine, trifluprazine and pipamazine.

Extrapyramidal symptoms occurred postoperatively in two patients premedicated with fluphenazine.

Lear, Edwin; Suntay, Remedios; Fisch, Herbert J.; Chiron, Albert E., and Pallin, Irving M. Jewish Hospital of Brooklyn, Brooklyn, N.Y. Ataraxic drugs in preanesthetic medication: blind studies in 1,852 patients. Anesthesiology 22:529-536 July-Aug. 1961

Missing link in the chain of local dental anesthetic asepsis

The three requirements for the administration of an aseptic local anesthetic injection are: (1) preparation at the site of injection, (2) sterility of the solution injected, and (3) sterility of the syringe and needle.

The site can be prepared efficiently by wiping the oral mucous membrane with a sterile swab and then applying an antiseptic solution prior to injection. Sterility of the solution is assured by use of a single dose anesthetic cartridge. The dental syringe, because of its relatively large bore, is accessible to mechanical washing and permits the free flow of steam during autoclaving. The weak link in the chain is maintenance of sterility in the needle.

The lumen of the needle can act as a trap for aspirated tissue proteins, epithelial plugs, tissue fluids and other contaminants. The evidence is conclusive (Peecook, 1956) that tissue fluid is aspirated whenever pressure is released on the cartridge piston. Autoclaving of a hypodermic needle does not insure its sterility.

Now available to the dental profession is a Carpule (Cook-Waite Laboratories, Inc.) dental needle (Fig. 1). It is available in lengths of 1 and 1⅝ inches, in 25 gauge or 27 gauge. The needle and the plastic cap and sheath which guard the needle from contamination have been sterilized with ethylene oxide vapor under pressure.

The aspirating syringe is held with the thumb and forefinger over the proximal end of the long window (Fig. 2). The needle is inserted, and as soon as the colored protective cap is removed (Fig. 3), the plastic hub drops in to rest on the thumb and forefinger. The diaphragm end of the cartridge is inserted in the plastic hub until the needle punctures the rubber disk. This assembly is allowed to drop all the way into the barrel of

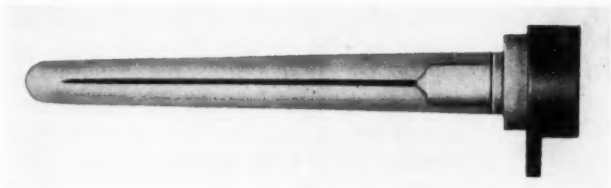


Figure 1 Presterilized needle

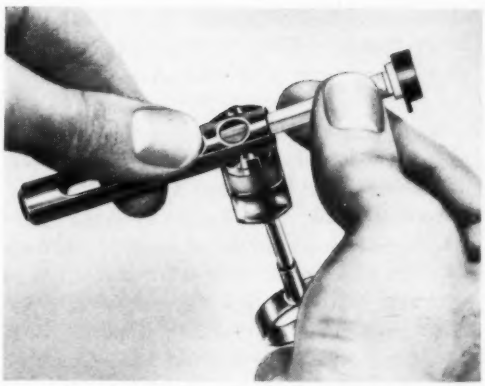


Figure 2 Needle is inserted into syringe barrel

Figure 3 Colored protective cap is removed

Figure 4 Syringe ready for injection

the syringe where it is secured by the positive lock and the harpoon engaged. The syringe now is ready. The needle guard is removed just before the injection is made (Fig. 4).

With this needle, sterility is assured. Concern about a dulled needle and a painful injection is eliminated, since the needle is used only once. A supply of needles is available for use at all times. Time is saved preparing for an injection.

Winter, Leo, Jr. 650 Main Street, New Rochelle, N.Y. A practical solution to the missing link in the chain of local dental anesthetic asepsis. New York State D.J. 27:71-74 Feb. 1961

Pedodontics

Class II cavity preparation in deciduous teeth

For the Class II cavity preparation in deciduous teeth, the following technics and principles are recommended:

1. The occlusal step should be dovetail in shape, the outline being composed of arcs of circles and gently rounded curves. The outline form should include all sharp, retentive occlusal fissures, pits, developmental grooves and all carious regions. The distance the occlusal step is extended mesially or distally will vary with the morphologic and anatomic characteristics of the occlusal surface of the individual tooth. The cavosurface margins should not be in stress-bearing regions. No cavosurface bevel should be placed. The side walls of the occlusal step should be parallel, or should converge slightly as they approach the cavosurface margin. The angle formed by the side walls of the occlusal step and the pulpal wall should be rounded gently, as should the pulpal wall and the pupal axial line angle.

2. As to the proximal box, the buccal and lingual walls should flare sufficiently so that the proximobuccal and proximolingual cavosurface margins are in self-cleansing areas. A cavosurface angle of 90 degrees is desirable. The proximal box should be sufficiently deep so that a substantial gingival wall may be established, all carious regions removed, and the proximogingival cavosurface margin established under the free margin of the gingival tissue. The flare of the buccal and lingual walls should be kept to a minimum consistent with extension into the relatively immune embrasures. The buccal and lingual walls of the cavity box should converge slightly from gingival to occlusal surfaces, with the greatest buccolingual width in the gingival region. The buccogingival and linguogingival line angles should be gently rounded. Buccal axial and lingual axial retention grooves may be placed from the gingival wall occlusally to the dentinoenamel junction. The side grooves should be round.

The use of a rubber dam, a matrix band, a gingival wedge (to prevent an overhang of silver amalgam) and careful trituration are recommended. The speed of mechanical amalgamation permits multiple mixes to be made, which assures the use of fresh mixes of amalgam when large cavities are to be restored.

The condensing point should fill as much of the cavity space as possible. Small condensing points "punch" through the amalgam. A rocking or vibrating force is best for eliminating excess mercury.

In carving the silver amalgam restoration to contour, only those surfaces which can be polished later should be touched. Carving, therefore, is confined to the occlusal surface and the buccal and lingual margins of the proximal box. If there is an excess of silver amalgam, it should not be removed until later when the restoration is polished. Finishing and polishing should be done about one week after the restoration has been placed. Sharp large round and fissure burs and stones may be used to remove high spots and any excess amalgam covering enamel margins. Excessive amalgam at the gingival margin may be removed with gold files. To remove scratches, a mixture of pumice and water flavored with a drop of oil of wintergreen is used on a prophylaxis brush with stiff bristles. For the final polish, tin oxide, or whiting mixed with water to form a thick paste, is applied with a brush.

Ireland, Ralph L. College of Dentistry, University of Nebraska, Lincoln, Neb. The Class II cavity preparation for primary teeth and its restoration with silver amalgam. D. Practitioner 11:208-212 March 1961

Roentgenography

Control of common radiation hazards in New York City

In the past few years, New York City has developed an extensive radiation control program. The program is interdepartmental, with major responsibility vested in the health department. A new section of the New York City Health Code, enacted by the board of health in 1959, requires

registration of every source of radiation in the city, notification of hazardous shipments of radiation materials and of all newly installed radiation installations, and reporting of accidents, incidents and overexposures.

Emphasis has been placed on helping dentists and physicians reduce to a minimum the radiation dose to patients from the use of x-ray equipment. This source of radiation constitutes an estimated 96 per cent of all man-made radiation to which the population is exposed. It has been possible to reduce radiation hazards significantly.

The city's 12,463 registered radiation installations fall in the following owner categories: dentists, 6,409; physicians, 5,128; podiatrists, 442; hospitals, 343; veterinarians, 70; osteopaths, 65, and chiropractors, 6.

The program has been approved by both the dental and the medical societies. A $15 fee covers registration for two years; thereafter, a payment of $10 is required biannually.

Under the program, steps have been taken also to control the use of radium, and preparations are being made to deal with problems of radioactive isotopes, transportation of radioactive materials, disposal of radioactive waste and fallout as the need becomes evident.

Baumgartner, Leona, and Blatz, Hanson. Commissioner of Health, New York City, N.Y. Control of common radiation hazards in New York City. Pub.Health Rep. 76:583-590 July 1961

Evaluation of the oblique cephalometric film

Roentgenographic cephalometry offers many exciting opportunities to the pedodontist for useful investigation. Of particular interest is the oblique cephalometric film, obtained by rotating the head-holder independent of the cassette so that the midsagittal plane of the head is at a 45 degree angle to the cassette. If the oblique film is to be employed in measuring the size of teeth, length of arch, and rates of eruption of teeth, it first must be established that the measurements are reliable. This study was undertaken to measure the factor of distortion and enlargement of the oblique cephalometric film.

Ten skulls, from subjects varying in age from one year through adulthood, were used. Disks of silver solder, 0.030 inch in diameter, were cemented to 11 sites on each half of the mandible and to eight positions on each half of the maxilla. Each skull was oriented to the Frankfort horizontal plane in a cephalostat and rotated 45 degrees to the plane of the film whereby exposures were made of each side. Measurements were made by calipers on skulls and film to an accuracy within 0.1 mm. Measurements were made of the mandibular and maxillary bases, tooth to tooth along the occlusal plane, and from the base to the occlusal height of both the maxilla and mandible.

In most instances, the projection on the film was larger than the object. However, each area of measurement showed a percentage variation that was typical for the area and relatively uniform from one skull to another, regardless of age.

Distortion was present in the oblique film and was related to the various contours of the maxilla and mandible. Because of such contours, certain measurements on the film were smaller than the direct measurements on the skulls. The distortion and enlargement demonstrated varied from bone to bone and from site to site within the bone.

The magnitude of distortion and enlargement on the oblique film was no greater than that found in the more generally employed projections in roentgenographic cephalometry. In fact, the degree of distortion for the oblique film was less than that encountered with the standard lateral headplate.

The results permit the conclusion that the use of the oblique film provides a valid means for documentation and research.

Barber, Thomas K.; Pruzansky, Samuel, and Kindelsperger, Ronald. 808 South Wood Street, Chicago 12, Ill. An evaluation of the oblique cephalometric film. J.Den.Children 28:94-105 July 1961

Cysts and tumors of the mandible

Some common cysts and tumors of the mandible may be diagnosed with reasonable accuracy from roentgenograms. In most instances, however, a biopsy is almost mandatory, because of the variable roentgenographic features of mandibular cysts and tumors.

The four common types of mandibular cysts are (1) periodontal or radicular, (2) squamous, (3) dentigerous, and (4) traumatic. The cysts of the first three types are lined with epithelium,

and are thought to increase in size because of the tension of the fluid or semisolid contents; thus, usually these cysts are globular due to the equal pressure in all directions. The cysts may be either single or multiple and may coalesce or remain separate. Some contain calcific material which often will provide a clue as to the roentgenologic diagnosis.

The common types of mandibular tumors are (1) odontogenic, (2) nonodontogenic, (3) of indeterminate origin, and (4) malignant. The odontogenic tumors include those that arise from dental germ, whereas the nonodontogenic tumors consist of neoplasms of the bone, cartilage, nerve and vascular constituents of the mandible that are not involved in odontogenesis. The tumors of indeterminate origin contain lesions of speculative etiology, and those closely simulating mandibular tumors in appearance. The malignant tumors encompass the primary malignant neoplasms, metastases, and morbid enlargements which involve the mandible by direct extension from the surrounding soft tissues.

In roentgenographic appearance, the margins of benign tumors of the mandible usually are well defined; these tumors have an intact cortex even though it may be thinned and expanded. Such tumors more frequently cause resportion of tooth roots, possibly attributable to their comparatively slow growth rate. Malignant tumors are the antithesis of benign tumors, and, in addition, may have a periosteal reaction or "sunburst" appearance.

Roentgenographically, a single cystic lesion with a well-defined margin that has no relation to a tooth most frequently is a squamous cyst. If the lesion is oriented to the root of a tooth, the possibility of a radicular cyst should be considered. When a cystic lesion is oriented to the crown or contains a tooth, it probably is a dentigerous cyst. Fibromas and myxomas are tumors that may simulate dentigerous or radicular cysts. Neurofibromas are observed as an oval radiolucency aligned to the central mandibular canal or can be seen in the subperiosteal area.

Squamous cysts may have a multilocular, well-defined appearance on initial roentgenographic study, but additional roentgenographic examination often will reveal the presence of a single cyst with lobulated margins. Fibrous dysplasia commonly has a multilocular appearance with gross expansion of the cortex.

Single or multiple radiolucent defects with poorly defined margins always should suggest the presence of metastases.

Thirty-seven roentgenograms illustrate the various mandibular cysts and tumors.

Jayne, E. Howard; Hays, Robert A., and O'Brien, Frederick W., Jr. Los Angeles County General Hospital, Los Angeles, Calif. Cysts and tumors of the mandible: their differential diagnosis. Am.J.Roentg. 86:292-309 Aug. 1961

A ten state study of radiation hygiene in 1,955 dental offices

This paper reports on a survey of the status of radiation hygiene in 1,955 dental offices in the Central, Pacific Coast and Atlantic Coast areas. About 1 in every 49 dentists in the United States was covered. The survey was coordinated by the University of Illinois group in cooperation with ten other dental schools selected to implement a significant geographic distribution of local dental offices. The ten schools involved were Baylor University, Emory University, Indiana University, Temple University, Tufts University, University of Detroit, University of Kansas City, University of Minnesota, University of Southern California and University of Washington. Evaluation of the accumulated data provided records of roentgen output of each machine, and relative r dose to patient and to operator.

The tables utilized were designed to permit the practicing dentist not included in the survey to estimate the roentgen output of his x-ray machine, relative r dose to patient and dose to operator.

The operator dose was lowest in all categories in the Pacific Coast area. Collimation appeared to be more effective than added filtration in reducing operator dose at a given distance. The operator dose was lowest for those machines with both collimation and added filtration. When patient-operator distance was greater than four feet, a relatively large decrease in the milliroentgen dose to the operator was noted.

Some dentists were found to be operating under unsafe conditions. The average dentist covered in this survey is statistically safe. However, individual dentists may not be operating within the limits of safety suggested by the National

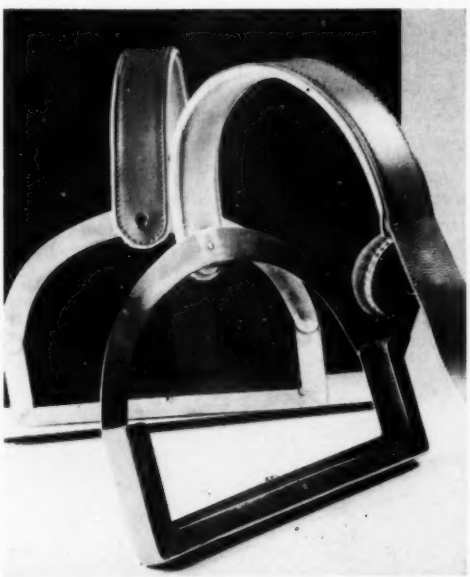
Bureau of Standards. Many dentists are receiving more than the maximum permissible dose per second and are safe only because of limited utilization of x-ray equipment.

The problem of radiation hazards in dentistry will be resolved when all dental x-ray machines are properly filtered and collimated, and high-speed dental x-ray film is used.

Yale, Seymour H. College of Dentistry, University of Illinois, Chicago, Ill. A ten state study of the status of radiation hygiene in dental offices. J.A.D.A. 63:201-210 Aug. 1961

Simplified roentgenographic survey for the handicapped patient

Dental diagnosis and evaluation of the handicapped patient frequently are rendered difficult by inability to obtain adequate roentgenograms. A technic which produces a complete, clear roentgenographic survey of the entire mouth of the handicapped patient has been developed in the dental department of the Michael Reese Hospital, Chicago. The roentgenographic survey is based on right and left lateral headplate roentgenograms and upper and lower anterior intraoral roentgenograms.



Cassette holder keeps film in proper position

To produce 5 by 7 inch lateral headplate roentgenograms, the following materials should be added to the standard 65 kv. dental x-ray unit and normal darkroom equipment: (1) either two 5 by 7 inch paper film holders or two 5 by 7 inch cassettes with intensifying screens; (2) two 5 by 7 inch film holders for developing, and (3) 5 by 7 inch x-ray film. Although either paper film holders or metal cassettes can be used, better results are produced with the cassettes. The exposure time with the cassette is ½ second, 65 kv., 10 ma. When the paper film holder is used, the exposure time is increased to 2 seconds, 65 kv., 10 ma.

Loading of either type of film holder is easy; the film simply is inserted, care being taken not to touch it. Once fingerprints or scratches get on these sensitive screens, they will appear on all subsequent roentgenograms.

To take lateral headplates, the patient is positioned in the chair so that he is sitting upright, with the plane of occlusion parallel to the floor. The cassette or film holder is placed so that (with the teeth in occlusion) it is parallel to the long axis of the upper molars. The horizontal line across the center of the film holder should be parallel and in line with the plane of occlusion. Its center should be located at the mesio-occlusal aspect of the upper first molar. With the cassette or film holder in place, the head of the x-ray unit is tilted 20 degrees toward the horizontal and rotated enough to permit placement of the x-ray tube just posterior to the posterior border of the ramus of the mandible around the gonial angle. The tube is aimed at the mesial surface of the upper first molar on the opposite side. Generally, it is necessary for someone—the dental assistant, or the parent of the child—to hold the cassette for the patient. In many instances, holding the cassette and stabilizing the head of even a thoroughly sedated patient may be difficult. To overcome the difficulty, a cassette holder (see illustration) has been devised by the authors. When this device is in place, it holds the film in proper position.

To obtain the upper and lower anterior intraoral roentgenograms, the patient is seated upright and the film is placed flat on the incisal edges of the teeth. The film is held in place either by having the patient bite on it, or by having an

assistant hold the film in place with a hemostat. For the upper anterior view, the tube is placed at the tip of the nose at a 65 degree angle; for the lower anterior view, the tube is placed at the tip of the chin and the chin is raised sufficiently to allow a 30 degree angulation.

Lateral headplate roentgenograms provide an unsurpassed means for observing gross pathologic changes of the jaws, detecting suspected fractures, observing all the permanent teeth in children, and observing impacted third molars.

Steinberg, Arnold D.; Bramer, Max L., and May, Byron. Dental Department, Michael Reese Hospital, Chicago, Ill. Simplified radiographic survey for the handicapped patient. Fort.Rev.Chicago D.Soc. 41:5:9-11 March 1, 1961

Evaluation of a panoramic dental x-ray machine

Members of the National Bureau of Standards and affiliated Air Force personnel developed an automatic extraoral apparatus which utilizes principles of curved-surface laminagraphy to produce a full mouth roentgenogram on a single 5 by 10 inch film by means of a rotating cassette and x-ray tube head (*D.Abs.* 2:440-441 July 1957). Based on this prototype machine, a Panorex panoramic dental x-ray machine has been developed by the X-Ray Corporation of America. In this evaluation of the Panorex machine, the unit was used on 905 patients, divided into four groups according to the reasons for oral examination. Group A was used to determine the accuracy of an oral chart made from Panorex films; Group B, the value of the film as an aid in routine dental practice; Group C, the value of the film as a diagnostic aid to the interpretation of full mouth periapical roentgenograms, and Group D, the value of Panorex films for dental specialists.

An analysis of the first 500 films (Group A) indicated that 464 (92.8 per cent) were of diagnostic value. For forensic purposes, Panorex films showed an identification reliability of 99.4 per cent for the records charted from such films.

Charting a dental record from the Panorex film alone, without comparing it with the patient's condition, presented problems. Restorations were incorrectly described in regard to anatomic detail in 30.6 per cent of all records. Although large lesions were easily noted on the Panorex film, a keen, experienced eye was needed to identify small carious lesions. Anatomical description was difficult whenever buccal or lingual tooth surfaces were involved.

The Panorex machine produced a moderately acceptable full mouth roentgenogram with ease and rapidity, even in the hands of relatively inexperienced operators. Films showed excessive grain and poor contrast, which caused difficulty in diagnosing incipient interproximal lesions and prevented outlining the lamina dura. The definition of gross lesions, restorations and bone pathology was easily accomplished with the Panorex. The Panorex film alone, however, cannot replace the chairside oral examination.

The proposed modifications of the Panorex, considered necessary in an automatic dental x-ray machine suitable for general use, include: (1) elimination of excessive film grain, (2) a more stable and efficient chin rest, (3) more clearance between the camera and the patient's head, and (4) an adjustable rotary mechanism to conform to different arch forms so that overlap of dental contact points would be eliminated.

The model of the Panorex automatic dental x-ray machine tested was not found entirely satisfactory for use in general dental practice.

Kraske, Leonard M., and Mazzarella, Maurice A. U.S. Naval Hospital, Great Lakes, Ill. Evaluation of a panoramic dental x-ray machine. D.Progress 1:171-179 April 1961

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Anatomy

Anatomy of superior alveolar nerve

Fifty-one specimens of the superior alveolar nerve from persons 20 to 69 years old were studied. The anterior branch originated at the infraorbital canal in a bundle of one to three fibers. The posterior branch originated in two to four fibers. The medial branch was present in 45.9 per cent of the specimens, originating at the infraorbital groove or canal; in 23.5 per cent more of the specimens, the medial branch ramified from the anterior branch before the latter entered the infraorbital groove.

The anterior branch of the superior alveolar nerve reached the incisors in 100 per cent of instances, the cuspids in 80 per cent, the first bicuspids in 50 per cent, and the second bicuspids in 15 per cent, regardless of the condition of the medial branch.

The posterior branch reached the molars and the first bicuspids but not the cuspids.

The medial branch, when present, reached the bicuspids in 90 per cent of instances, the molars in 40 per cent and the cuspids in 10 per cent.

Takakama, Y. Department of Anatomy, Tokyo Dental University, Tokyo, Japan. Anatomical study on the superior alveolar nerve. Abs. Japanese Med. 1:1482 July 1961

Calcification of the permanent first molar in rhesus monkeys

Oral roentgenograms of 13 rhesus monkeys, some taken on the day of birth and some from 3 to 170 days postnatally, were studied. Calcification of the mandibular first permanent molar could be observed in 11 monkeys but was questionable in the remaining two monkeys; in these two monkeys the roentgenograms had been taken on the day of birth and three days later. The findings indicate that the mandibular first permanent molar is the first permanent tooth to calcify. In this respect, the rhesus monkey is similar to man.

One male rhesus fetus of about 129 days' gestation (170 days is average gestation period) was dissected and studied. All deciduous teeth were present and well-developed morphogenetically. The crypts for the mandibular and maxillary permanent first molars were discovered. The crypts for the maxillary molars contained only a membranous dental organ at a stage preceding the formation of hard structures, whereas the crypts for the mandibular molars had the membranous dental organ with two of the four crown tips beginning to calcify.

The data suggest a much earlier calcification time for the mandibular first permanent molar in rhesus monkeys than indicated by Marshall (1933) in his chapter in the book *Anatomy of the Rhesus Monkey*.

Swindler, Daris R. Department of Anatomy, Medical College of South Carolina, Charleston, S.C. Calcification of the permanent first mandibular molar in rhesus monkeys. Science 134:566 Aug. 25, 1961

Structure of the temporomandibular joint

The controversial points in the anatomy of the temporomandibular joints are: (1) the relation of disk to capsule, (2) the relation of disk to condyle, and (3) the relation of lateral pterygoid muscle to disk and capsule.

The authors derived the following conclusions from their studies and a review of the literature:

1. The upper surface of the interarticular disk is saddle-shaped, concave anteroposteriorly, and slightly convex mediolaterally to adapt to the saddle-shaped articular eminence. The lower surface of the disk is concave in both directions to adapt to the ovoid shape of the condyle.

2. Medially and laterally, the disk has a direct and independent attachment to the medial and lateral poles of the condyle. This attachment is by strong, short ligaments which are comparable to collateral ligaments of a hinge joint.

3. The disk is fused to the capsule only at its anterior body. The posterior border is continuous with a thick layer of loose connective tissue that provides the attachment of the disk to the posterior part of the articular capsule. This tissue can be termed the retrodiscal pad. Medially and laterally, the disk is not connected with the capsule at all.

4. Only the medial and superior part of the upper head of the lateral pterygoid muscle is at-

tached to the fused capsule and disk. This was ascertained only after careful dissection and observation. All the investigators who found fibers of the superior head of the lateral pterygoid muscle attached to the disk attributed the forward movement of the disk to the contraction of the muscle. Evidently, this attachment to the disk is not so much in the service of movement as in the service of maintaining the balanced position of the disk during mastication.

Choukas, Nicholas C., and Sicher, Harry. School of Dentistry, Loyola University, Chicago, Ill. Structure of the temporomandibular joint. Oral Surg.,Oral Med. & Oral Path. 13:1203-1213 Oct. 1960

Oncology

New series of 73 cases of salivary tumors, from Pretoria

This analysis, which brings up-to-date the investigation covering the period 1946-1953 made by Schulenberg (1954), includes the 73 cases of salivary tumors diagnosed microscopically by the Institute of Pathology in Pretoria, Union of South Africa, from 1954 to 1958.

Fifty-seven patients (78 per cent) had pleomorphic adenomas, compared with 81 per cent in the previous series. In both series, most of the tumors were found in patients ranging from 30 to 60 years old; those in the fifth decade were particularly susceptible. No patients were younger than ten years old, and the oldest patient was a 74 year old white woman.

Although most of the tumors occurred in the parotid glands, more than half of the Bantu patients had tumors in other sites.

Mixed tumors were found in 23 (40 per cent) of the white patients, and 34 (60 per cent) of the Bantu patients.

Whereas in the Schulenberg series, 55 per cent of the patients were females, in this series males predominated in the ratio of 3:2 (34 males to 23 females).

Of the 16 tumors in other sites, ten were primary carcinomas in the salivary gland, two were papillary lymphomatous cystadenoma, two were adenoma, one was adenolymphoma and one was oncocytoma.

Roos-Scholtz, J. E. Nelspruit, Transvaal, Union of South Africa. Tumours of salivary origin. South African M.J. 35:263-264 April 1, 1961

Physiology

Response of condylar growth cartilage to induced stresses

An experiment in three rhesus monkeys aged 44 to 50 months was designed to assess the response of the mandibular condyles to induced stresses. Monkey I served as the untreated control and Monkeys II and III as the experimental animals. Inclined bite planes were cemented on the upper and lower dental arches so that the mandible on occlusion was guided into a forward position. Monkey II was killed after 2½ months of treatment, Monkey III after 4½ months, and the condyles were examined.

The condyles of both experimental monkeys showed obvious changes in the gross morphologic and roentgenographic aspects. Histologically, the structural arrangement of the condyles compared with those of the normal control, showed increased cartilage proliferation in a backward and upward direction. Endochondral ossification was most active in the posterior portion. Since modeling resorption at the anterior surface lagged behind proliferation at the posterior surface, the condyles assumed a bilobed shape. The growth processes resulted in a bend of the condyles toward the fossa as if they were returning to the pretreatment position.

Thus, concrete evidence was obtained that the condylar growth center responds to functional therapy.

All epiphyseal plates of long bones are derivatives of the primordial cartilage skeleton; the condylar cartilage develops independently from it as a so-called secondary cartilage "grafted" on the mandibular membrane bone. Whereas epiphyseal plates grow interstitially, condylar carti-

lage accrues by surface apposition in a peripheral fibrocartilage layer. In contrast to other cartilage bones, no secondary ossification centers are formed in the condyles. Maturation never occurs; the cartilage persists through life, and it is never completely eroded or sealed off as are the epiphyseal plates. The condylar cartilage holds a unique position among endochondral growth centers.

Baume, Louis J., and Derichsweiler, Hans. Institute of Dental Medicine, University of Geneva, Geneva, Switzerland. Response of condylar growth cartilage to induced stress. Science 134:53-54 July 7, 1961

Uses and limitations of electromyography

Electrical changes accompany normal muscular activity. These electrical changes may be picked up by electrodes placed on the skin or embedded in the muscle, amplified, and recorded photographically or mechanically. Because of the ease with which the electrical changes can be recorded, it is desirable to relate them, as far as possible, to other fundamental neuromuscular processes.

A survey of electromyographic research shows that the integrated electromyogram can be related to isometric tension quantitatively, but that certain precautions must be taken to avoid complicating factors.

In electromyography, changing the conditions of the experiment, as by removing and replacing the recording electrodes, may entirely invalidate the results, as may the occurrence of fatigue. There are even more complicating factors to consider in electromyographic studies of dynamic performance.

Although under highly restricted conditions of excursion, load and speed of muscle contraction, quantitative relations with the electromyogram may be shown, such conditions are almost unobtainable in ordinary clinical practice. These conditions would be particularly difficult to obtain in studies on the muscles of mastication and other muscles important in dentistry. Nearly all the studies dealing with quantitative aspects of electromyography have been done on large muscles of the extremities, which are readily accessible and relatively easy to work on.

It is doubtful if quantitative electromyographic studies will prove of value in the field of dental research.

Ralston, H. J. College of Physicians and Surgeons, San Francisco, Calif. Uses and limitations of electromyography in the quantitative study of skeletal muscle function. Am.J. Orthodont. 47:521-530 July 1961

Miscellaneous

The dental clinics and dental research

Dental clinics—such as the Eastman Dental Dispensary, Forsyth Dental Infirmary, Zoller Clinic, and Guggenheim Dental Clinic—are peculiarly American. They were established as independent institutions by laymen to fill dental needs as laymen saw them, and generally the needs concerned improved dental service for children.

Some of these institutions have large sums of money available for expenditure in the field of dentistry; this offers an opportunity and a challenge to develop programs in which the resources can be used effectively.

When these institutions were established—Forsyth in 1914 and Eastman in 1915—they represented essentially the only places where dental graduates could get additional clinical experience before entering dental practice. In retrospect it can be seen that opportunities to develop dental research at these clinics were lost. If the opportunities had been seized, the independent dental clinics might have developed into a counterpart of the teaching hospitals in medicine, in which patient service, research and postgraduate instruction are combined to the advantage of the public and the profession.

In dentistry, the postgraduate educational situation rests almost entirely with the dental schools, whereas in medicine agencies outside the medical schools—the teaching hospitals—are in control of postgraduate education. If, in the past, the existing endowed dental clinics had been bound into the fiber of dental education, the relation between teaching, research and service would have been placed in better balance than it is today. Good examples in this area might have stimulated more

philanthropy and public support which dentistry needs so badly. Instead, dental education has somewhat parted company with its responsibility for meeting the needs of the public. The dental schools take only such patients as they need for teaching purposes, and accept no additional responsibility for the community. This circumstance tends to separate the dental student from a sense of social responsibility.

The failure of the independently endowed dental clinic to develop, as have the teaching hospitals, has brought other consequences; organized dentistry does not seem to appreciate their potential, and their existence has been ignored by some of dentistry's accrediting agencies.

Perhaps the greatest handicaps to dental research are the lack of good clinical observation and the careful selection of research material. These lacks are delaying progress toward an understanding of dental caries and periodontal disease. The big break-through in the field of dental caries—the fluorine-caries relation—came from good, careful clinical observation. Another allied possibility—the promising effect of phosphates in caries reduction—came largely from clinical observations.

By associating research with the clinic, the profession can help correct the too common tendency to act as if the respectability of research were increased as it moves further away from having applications. The quality of research depends on the mental processes going into it, not the complexity of the apparatus used or the field in which it is done. The proudest product of dentistry is the high-class clinician, who has a good mind, who likes to use it, and who is interested in furthering his knowledge.

Dental clinics can recruit qualified people, create an atmosphere in which they will develop, give them the inspiration and sense of purpose they need, and provide them with the opportunities to become what they want to be. To achieve this purpose, the clinic should be separate from undergraduate dental instruction. The clinic should be large enough to bring together a dozen or so dental graduates from a number of institutions. The staff must be large enough to supply a certain amount of organized instruction. The institution must provide laboratories under experienced and sympathetic direction, so the man who wants to try his hand in research can have the opportunity.

The value of postgraduate dental clinics as agencies to recruit men for advanced dental education cannot be overestimated.

Bibby, Basil G. Eastman Dental Dispensary, Rochester, N.Y. Education for research—the dental clinic. J.D.Educ. 25:141-144 June 1961

Evaluation of the adaptation period needed for wearing complete dentures

An electronic measuring and automatic recording apparatus has been devised which provides information on postinsertion denture problems such as the masticatory capacity, optimal adaptability, gradual adjustment and maintenance, and the differences in time required by individuals to become accustomed to the wearing of complete dentures.

The comparatively simple apparatus was tested in a large series of patients with complete dentures at the Dental School of the University of Freiburg/Breisgau, Germany.

Prior to the tests, all patients were examined by dentists and physicians, and only those were included who had been found physically and psychically free from other than the diagnosed dental defects. All patients had volunteered to participate in the tests and had promised to cooperate fully.

The registered curves revealed in each instance the relative strength of the masticatory force, the individual degree of tactile sense and contact stimuli, and the changes in the sensibility of the oral mucosa after the insertion of complete dentures.

In the estimation of the time required for perfect adaptation to the complete dentures, several factors are involved. Initially, the anatomic form of the alveolar process, the resilience of the oral mucosa, the function of the temporomandibular joint, and the individual height of the bite have to be considered. After the insertion of the complete denture, the physical and psychic reactions of the patient play an important part.

By proper utilization of the advances made in the clinical and technical procedures of complete denture construction, such as the taking of im-

pressions, registering of the bite, conditioning and preparing of the patients, evaluating the condition of the soft tissues beneath the denture, improving the esthetic and functional values of the denture and, last but not least, in achieving laboratory accuracy, the patient's adaptation to the inserted complete denture will be obtained.

The measuring and recording apparatus was used to evaluate the individual adaptation to the dentures 2, 6, 10 and 14 weeks after insertion. Several periodic dental examinations were carried out to determine whether adjustments or repairs were required to eliminate constructional faults causing pressure spots or occlusal defects. The subjective complaints of the patients were noted, and, if clinically confirmed, the constructional causes for such complaints were eliminated.

On the first postinsertion day, the apparatus registered in almost all patients a significant decrease in masticatory capacity. The recorded curves showed that the masticatory values were about 42 per cent of normal in patients with complete upper dentures, but only 29 per cent of normal in those with complete lower dentures.

After the first postinsertion week, an improvement of about 16 per cent was observed in patients with complete upper dentures, and of about 6 per cent in those with complete lower dentures.

After the sixth postoperative week, the normal masticatory capacity recurred in almost 100 per cent of patients with complete upper dentures. In patients with complete lower dentures, the same degree of masticatory efficiency was not obtained before the eighth postinsertion week. In most instances, the subjective statements of the patients regarding their satisfaction with the inserted dentures were identical with the measurements recorded by the apparatus in regard to masticatory function.

The use of this measuring device will aid the dental practitioner not only in the recognition of anatomic abnormalities which may complicate the patient's adaptation to complete dentures but in the psychologic preparation and conditioning of the patient by providing information as to the approximate date the maximum masticatory capacity can be expected.

Speer, Ernst. Dental Clinic, University of Freiburg, Hugstetter Strasse 55, Freiburg/Breisgau, Germany. Über die Eingewöhnungszeit von totalen Prothesen. Deut.zahnärztl. Zschr. 15:1430-1432 Oct. 15, 1960

Experimental calculus formation in the rat

This study in the rat was designed to evaluate methods for scoring calculus and to explore the effects on calculus formation of such experimental factors as the effects of sex difference, strain difference, and differences in the types of carbohydrates and the amount of protein in the diet. The conclusions were as follows:

1. The average scores were very similar for male and female rats.

2. All six strains of rats tested were capable of forming calculus on a diet containing 66 per cent sucrose.

3. Dental calculus was produced in Sprague-Dawley weanling rats in 30 days on diets of a fine physical consistency and relatively high caloric content.

4. Older rats (6 to 11 months old) did not form calculus as readily as younger rats (1 to 3 months old).

5. A carbohydrate diet containing 66 per cent cornstarch produced more calculus than similar diets containing either 66 per cent sucrose or 66 per cent glucose, or a diet of equal caloric value in which fat was substituted for the carbohydrate.

6. More calculus was formed on the maxillary than the mandibular teeth.

7. A diet containing 62 per cent protein and 13 per cent sucrose did not produce any more calculus than one containing 25 per cent protein and 50 per cent sucrose, all other ingredients being identical.

Baer, Paul N.; Stephan, Robert M., and White, Carl L. National Institute of Dental Research, Bethesda, Md. Studies on experimental calculus formation in the rat. I. J.Periodont. 32:190-196 July 1961

Nerve regeneration in replanted hamster teeth

This study was undertaken to determine the possibility of regeneration of nervous tissue within the replanted mandibular second molar of the Syrian hamster. Twenty second molars were replanted in ten hamsters ranging in age from 18 to 32 days. Replantation of the right and left second molars was accomplished during the same surgical procedure. Most extracted teeth were replanted immediately, but some were observed

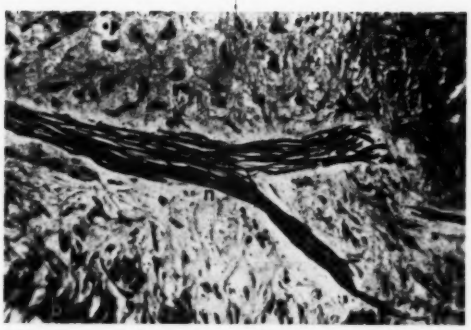


Figure 1 Section from pulp of replanted tooth. n = regenerated nerve. b = odontoblasts

microscopically for periods of up to 5 minutes before replantation. After replantation, half the replanted teeth were held in place by means of a self-curing acrylic splint placed over the erupted first molar and replanted tooth (the third molars in most of the hamsters had not erupted at the time of surgery). The animals were sacrificed at definite intervals; at sacrifice, the animals ranged in age from 34 to 63 days, and mature replanted teeth which had been retained for from 16 to 43 days were available for histologic study.

Sixteen of the 20 replanted teeth were observed to be in position. No replanted teeth which had been splinted were lost, even though the acrylic splints were not retained until time of sacrifice of the animals. Twelve of the 16 retained teeth appeared clinically normal and showed no evidence of replantation procedures. Two replanted teeth exhibited increased mobility. A dark discoloration was seen in two replanted teeth, one of which was in infra-occlusion.

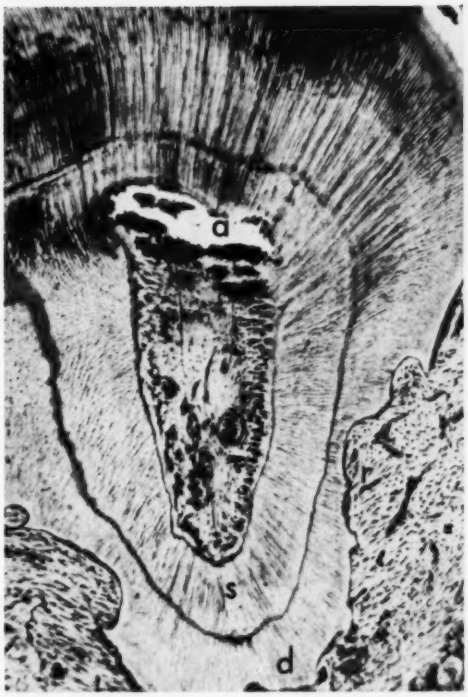
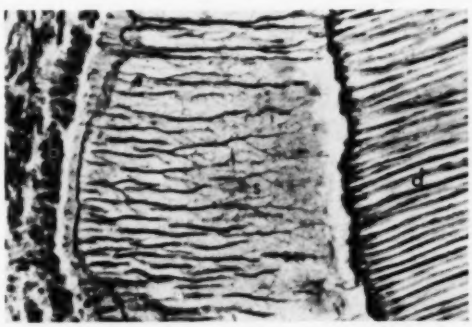
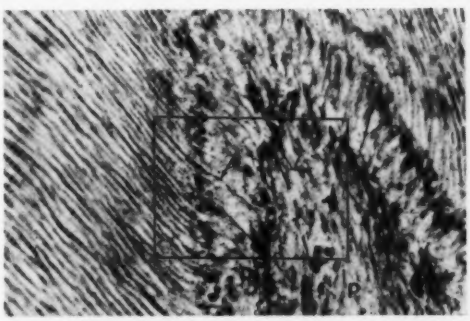


Figure 2 Longitudinal section of replanted tooth showing dark-staining zone between dentin (d) and reparative dentin (s). r = root resorption. Pulp contains organized odontoblastic layer, vessels and regenerated nerves. a = artifact

Apparent periodontal reattachment was observed in all the retained replanted teeth, and the histologic appearance of the newly formed periodontal fibers was in no way different from fibers forming the periodontal membrane of the first and third molars. Eleven replanted teeth showed his-

Figure 3 (Left) Section from replanted tooth. Dark-staining zone between dentin (d) and reparative dentin (s) indicates time of replanting procedure. b = odontoblasts. Figure 4 (Right) Longitudinal section of replanted tooth showing nerve fibrils (arrows in area of odontoblasts b). p = pulp





tologic evidence of root resorption. Three of the replanted teeth exhibited pulps which were completely normal in histologic appearance, and six replanted teeth contained normal pulp tissue but included varying amounts of ostoid material which followed the dentinopulpal junction.

Regenerated nerves were observed in 9 of the 16 replanted teeth (Fig. 1). Normal pulpal tissue, including vessels, odontoblastic layer and regenerated nerve tissue, could be seen in both root chambers and pulp canals. The only teeth to exhibit regenerated nerve tissue were those which revealed normal histologic pulp or teeth containing some normal pulpal material, with the remaining pulpal area occupied by an ostoid material. In all teeth except one, a distinct, dark-staining area was visible in the matured calcified dentin, which appeared to indicate reparative dentin (Fig. 2). The innermost layer of dentin, apparently laid down after the replantation procedure, had poorly organized tubules which were branched and fewer in number (Fig. 3). Root resorption was prominent in the replanted teeth. Nerve trunks appeared to traverse the root canals and approach the cuspal areas, where they branched into fibrils and filaments which terminated as beaded or free endings among the odontoblasts. Occasionally the filaments appeared to penetrate the predentin and dentin areas (Fig. 4). Terminal endings were most conspicuous in the cuspal areas and were not evident in sections of the root canal. Nerve tissue within the root canals seemed to end at or in the odontoblastic layer.

The presence of regenerated nerve demonstrated in 9 of 16 replanted teeth is of particular interest when coupled with the speculation that an interrelation exists between pulpal nerve and odontoblastic health and function.

The quality of periodontal reattachment and root resorption was not dependent on the amount of vital periodontal membrane retained on the tooth root during replantation procedures.

Sorg, W. Roger. School of Dentistry, University of Pennsylvania, Philadelphia, Pa. Nerve regeneration in replanted hamster teeth. J.D.Res. 39:1222-1231 Nov.-Dec. 1960

Dental materials

Proportioning of dental amalgam

Amalgam proportioners readily available on the Australian market were investigated for accuracy. Two alloy balances and five volumetric dispensers were tested, as were predispensed pellets and Sigrens strip envelopes. The following conclusions were reached:

1. With reasonable care, proportioning by means of an alloy balance provided a degree of accuracy similar to that obtained by other means of dispensing.

2. Provided the manufacturer's instructions are followed, the dispensers tested showed a degree of accuracy within required limits. All volumetric dispensers tested showed a standard deviation of about 1 per cent.

3. The use of fine-grain alloys is necessary to ensure accuracy in volumetric proportioning of alloy.

4. Almost without exception, the dispensation of mercury was remarkably accurate.

5. Alloy predispensed in pellet form or in strip envelopes provided a degree of accuracy well within the required limits.

Lyell, J. S., and Wing, G. United Dental Hospital, Chalmers Street, Sydney, Australia. Proportioning of dental amalgam. Austral.D.J. 6:127-129 June 1961

dental health

Fluoridation

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Fluoridation

Fluoride dilemma for public health educators

No other scientific discovery in recent years has created so many problems for health educators as has the discovery of the use of fluoride salts in preventing dental caries. Many confusing issues, other than the fact that fluorine (fluoride ion) used properly does reduce caries, are involved.

Many individual practicing dentists do not subscribe to the factual data relating to fluoridation which are accepted by their local, state and national professional groups. It is unfortunately true that when local dentists who favor fluoridation have passed a resolution in the local dental society, they fail to follow up by attending public meetings on the topic. It is far more common for the dentist who objects to fluoridation to be present at the meeting, and to divert attention to side issues and exceptions to the general rule, such as the influence of weather on the consumption of drinking water, and the effect on children who do not consume water but do consume other beverages. Such exceptions to the general rule frequently are so thoroughly aired at group meetings that the general over-all benefits to be gained from fluoridation of public water supplies by the majority of the people are either ignored, or seemingly lose their powers of persuasion.

In the face of all difficulties, tremendous gains have been made in public water fluoridation and prescription programs for preventive dentistry in the last few years. Health educators can best support the use of fluorine in preventive dentistry by: (1) studying continuously the literature to keep abreast of new information; (2) working closely with local, state and national dental societies and with individual local dentists; (3) enlisting the aid of parents, local lay leaders and civic groups; (4) enlisting the aid of allied professional groups; (5) keeping aware of the role that other factors such as diet and proper dental care play in maintaining good dental health, and (6) keeping up a continuous flow of information through the mass media regarding the use of fluorine and other measures used in preventive dentistry.

Grissom, Deward K. Southern Illinois University, Carbondale, Ill. The fluoride dilemma for public health educators in preventive dentistry. J.Den.Children 28:163-165 July 1961

Second evaluation of fluoridation in Curico-San Fernando, Chile, 1959

After suitable preparations and dental research studies in the towns of Curico and San Fernando, Chile, fluoridation of the public water supply of Curico was begun in 1953. A first evaluation of the effects of fluoridation was made in 1956, and the second evaluation, reported in this study, in 1959. In October 1959 two dentists examined 3,045 children in Curico and 1,947 children in San Fernando; the children ranged in age from 3 to 15 years.

In 1959 at ages 3, 4 and 5 years, the numbers of DMF teeth in Curico children were 57 per cent, 45 per cent and 34 per cent less than the numbers in San Fernando children.

In 1959 the numbers of DMF teeth per 100 children in San Fernando and Curico, at the stated ages, were as follows: 3 years: 575.8 and 249.7; 5 years, 739.6 and 491.3; 7 years, 238.7 and 146.4; 11 years, 648.4 and 452.2; 12 years, 812.7 and 550.0, and 15 years, 1,218.3 and 830.0.

Whereas only 10.94 per cent of the 3 year old children in San Fernando were free of caries in 1959, 46.1 per cent of the 3 year old children in Curico had no caries. At other ages, the percentages of caries-free children in San Fernando and Curico were as follows: 5 years, 6.7 per cent and 20.54 per cent; 7 years, 2.4 per cent and 7.9 per cent for deciduous teeth and 21.0 per cent and 42.9 per cent for permanent teeth; 11 years, 1.8 per cent and 7.9 per cent, and 15 years, 0.0 per cent and 2.1 per cent.

When a ten year study is made in 1963 it is anticipated that the benefits of fluoridation will be even more apparent than revealed in 1959 and 1956. The results obtained to date in Chile have been comparable to those obtained in the pilot studies conducted in the United States.

Adriasola E., Guillermo. Comité Profluoración, Santiago, Chile. Segunda evaluoacion del programa de fluoración del agua potable de Curico-San Fernando, Chile, 1959. Odont. Chilena 10:41-45 March-April 1961

Bone density and fluoride ingestion

A roentgenologic study of 546 persons between the ages of 30 and 70 years was conducted in Framingham, Mass., where the water supply contains less than 0.1 ppm fluorine (fluoride ion) (Leone, 1960). Among the 546 persons investigated, 279 instances of osteoporosis were found, of which 77 were severe and advanced. Osteoporosis occurred in both men and women, and in some persons who were younger than is ordinarily expected for the appearance of this disease. In addition, the authors observed 14 persons with coarsened trabeculation, 100 with calcified abdominal nodes, 118 with calcified vessels, 36 with severe bone spurs and ligamentous calcification, and seven with Paget's disease. Calcified intervertebral disks, narrowed intervertebral spaces and collapsed vertebrae also were found in a large number of persons. These data support the hypothesis that "disadvantageous effects on the bone structure of the adult population may be associated with the prolonged use of drinking water that contains an insufficient concentration of fluoride."

The suggested correlation of osteoporosis with inadequate fluorine intake is important enough that studies to determine this possible relation should be organized as soon as possible. It may be that optimal fluoride ingestion in time may prove to be helpful, not only in the presently well-established partial control of dental caries, but in the partial and highly beneficial prevention of osteoporosis with all the problems associated therewith among older persons.

99 Park Avenue, New York 16, N.Y. Bone density and fluoride ingestion. Nutrition Rev. 19:198-199 July 1961

Effect of high fluorine and iodine doses on the pituitary gland in rats

Histologic and electron microscopic investigations were carried out at the Pathologic-Anatomic Institute of the University of Bern, Switzerland, to determine the possible effects of comparatively high doses of either fluorine (sodium fluoride) or iodine (sodium bismuth iodide) on the pituitary glands of rats.

The fluorine group (36 albino rats of both sexes) received 4.5 ppm of sodium fluoride during 12 months with drinking water (containing 0.1 ppm natural fluorine).

The iodine group (36 albino rats of both sexes) received an iodine dose 200 times the natural (daily) iodine requirement, also for 12 months.

The control group (12 albino rats) received neither fluoride nor iodine doses.

After 14 months, all animals were killed and specimens of the pituitary glands prepared for either electron microscopic or traditional histologic examinations.

The histologic picture of the pituitary gland of all animals of the iodine group revealed the presence of definite pathologic alterations which under the electron microscope appeared to be a specific form of colloidal degeneration and compression of the cellular structures. An increase in the number of parafollicular cells within the affected (necrotic) pituitary gland—also observed under the electron microscope—appeared to be the product of a pseudoreaction such as a temporary replacement for the cells lost by degeneration.

The histologic picture of the pituitary gland of most animals of the fluorine group showed no signs of such pathologic glandular disturbances.

There were also no demonstrable symptoms of an iodine-fluorine antagonism.

These facts seem to indicate that all experimental rats were able to tolerate even high amounts of fluorine without demonstrable damage to the pituitary gland.

Waller, U. Pathologic-Anatomic Institute, University of Bern, Freiburgstrasse 30, Bern, Switzerland. Histologische und elektronenmikroskopische Untersuchungen über die Wirkung hoher Jod- und Fluordoses auf die Rattenschilddrüse. Schweiz.Mschr.Zahnhk. 71:561-576 June 1961

Metabolism of fluorides

Although fluorine cannot be listed as an element essential to life, it is now established beyond reasonable doubt that optimal quantities of fluorine (fluoride ion) are desirable and beneficial in improving tooth health. A knowledge of fluoride metabolism provides some understanding of the possible role of fluorine in tooth health, as well as some reassurance as to the safety of fluoridated water.

Soluble fluorides are absorbed promptly. Once absorbed, fluorides are rapidly distributed

throughout the body fluid. With notable promptness, absorbed fluorine is deposited in the skeleton or excreted from the body via the urine. Only bone and calcified tissues serve as storage sites of fluorine.

The fluorine content in the skeleton is greater if larger concentrations of fluorine are present in the drinking water.

The enamel surface of the tooth is a deposition site, presumably because of contact with foods or water containing fluorine. Deposition takes place in enamel, dentin or bone through an exchange with hydroxyl ions in the apatite crystals. Fluorine is lost slowly from the enamel, partly by an exchange with hydroxyl ions but mostly from adult bone by the slow process of the osteoclastic-osteoblastic cycles of the haversian systems.

Hodge, Harold C. University of Rochester School of Medicine and Dentistry. Metabolism of fluorides. J.A.M.A. 177: 313-316 Aug. 5, 1961

Fluoridated water and dermatitis

It is reported that certain citizens of Corvallis, Ore., maintain that they have noted dermatitis possibly caused by contact with or ingestion of fluoridated water.

Although most chemical substances known to man are potential allergens, there is no documented evidence to indicate that fluoridated water, either by contact or through ingestion, will produce an allergic reaction in other than extremely rare instances. Even in such instances, the possibility that other substances in the water are the responsible agents cannot be excluded. There is no reliable evidence that 1 ppm of fluorine (fluoride ion) in the water will produce any ill effects in human beings.

Bernier, Joseph L. 6905 Hillmead Road, Bethesda, Md. Fluoridated water. J.A.M.A. 176:1062 June 24, 1961

Fluoridation of water supplies in The Netherlands

In March 1953, the community water supply of Tiel was enriched by the addition of 1.1 ppm fluorine in the form of sodium fluoride. Tiel, with a population of about 20,000, served as the experimental city, and Culemborg, with a population and socioeconomic characteristics similar to Tiel, served as the control city. Culemborg's water supplies contain 0.1 ppm fluorine.

In both cities, dental examinations of all school children have been carried out since 1952. Carious lesions were classified as occlusal, proximal, buccal and lingual. Because these forms of caries do not correlate in numbers and respond differently to fluorine, the obtained figures cannot be evaluated by simple addition.

The most difficult problem in evaluating the results consisted in the interpretation of the data concerning proximal caries which could be diagnosed only by roentgenographic studies.

The advantages of the investigation method used in Tiel and Culemborg were as follows: (1) the possibility of carrying out double-blind tests; (2) the capacity to permit extensive and controllable standardization; (3) the ability to recognize secondary and subsequent effects, and (4) the feasibility of saving time.

The results of the dental examinations, carried out in 1952 and 1953, have demonstrated that there was no significant difference in the incidence of caries between the school children of Tiel and those of Culemborg. In 1955, there appeared a still insignificant reduction in the caries incidence in Tiel, if compared with that in Culemborg; whereas in 1957 (54 months after introduction of fluoridation), the difference was significant.

The 1957 survey showed a continuing reduction in the caries experience in Tiel, indicating a higher percentage of children having caries-free permanent teeth, a lower percentage of DMF teeth, a lower percentage of carious first molars, and a lower average value in proximal cavities in children between 6 and 13 years old.

The recently obtained data indicated that a significant and progressive reduction in the incidence and severity of caries has taken place in Tiel during the periods between surveys since 1953. There were no unfavorable effects of either a dental or medical nature associated with fluoridation; this was reported by members of the dental profession and the medical profession, and confirmed by the health authorities of Tiel and Culemborg.

Backer Dirks, O. Catharijnesingel 59, Utrecht, The Netherlands. Trinkwasserfluoridierung in den Niederlanden. Deut. Stomat. 11:289-293 May 1961

Melville, T. H. Liverpool Dental School, Liverpool, England. Bacteria on the toothbrush. Brit.D.J. 111:90-92 Aug. 1, 1961

Miscellaneous

Bacteria on toothbrushes

The subjects of this study were 12 lecturers and technicians from the Liverpool Dental School, ranging in age from 18 to 38 years. Six were men and six were women. The subjects cleaned their teeth at night as usual, using their old brushes. In the morning each subject cleaned his teeth for the first time after arriving at work, with a new toothbrush used for the duration of the experimental period. Six of the subjects used tooth paste and six used water only. Each subject cleaned half of his mouth at 10 A.M. and rinsed his brush as he would normally do. The head of the brush then was briskly shaken up in 10 ml. of sterile distilled water. The other half of the mouth then was cleaned in the same way, the brush rinsed as before and hung up. After an interval of six hours the head of the brush again was shaken up in sterile distilled water. Bacterial counts and Snyder's tests were carried out on washings from the toothbrushes.

Each subject also brought his old toothbrush from home in a sterile tube; the brush was washed in sterile distilled water 12 hours after use, and the washings were tested.

From the old brushes, the numbers of bacteria were, with two exceptions, higher than those from the new brushes of the same subjects tested six hours after use. For old brushes, the four highest counts were between 1.5 and 2.0 million microorganisms per toothbrush. Even with these old brushes, however, the highest counts found 12 hours after use were not more than would be expected from 0.002 ml. of saliva. After 12 hours, no positive reaction to the Snyder test was obtained.

Washings from the freshly used toothbrushes of 5 of the 12 subjects gave a positive reaction to the Snyder test, but never if the washings had been taken 24 hours after use.

Viable counts of bacteria in the washings of toothbrushes are very low compared with the numbers of bacteria in saliva.

Study of an electrical toothbrush

Twelve subjects trained in proper toothbrushing technics were given oral examinations, oral prophylaxis and instructions in the use of the Broxodent R toothbrush, an electrically driven, automatic-action toothbrush. The Broxodent consists of a plastic handle that contains an alternating current electric motor activated by pressure on either of two buttons on the housing. From one end of the handle descends the power cord; in the other end is a slot to receive the base of the brush head which is constructed of a polyene plastic and can be sterilized.

The 12 patients were divided into two equal groups. Group I was instructed to use a conventional toothbrush in the maxillary arch, and the Broxodent in the mandibular arch. Group II was instructed to reverse this procedure. After a trial of four months, all patients were re-examined, and their subjective reactions solicited.

Patients who left soft deposits on the teeth in the arch on which the conventional toothbrush was used also left soft deposits on the opposing arch on which the electrical toothbrush was used; however, in the arch brushed with the electrical toothbrush such deposits were both fewer in number and smaller.

None of the patients reported any injury to the gingival tissues.

Eleven of the 12 patients said they found the electrical toothbrush easy to use. Three said it was more effective than a conventional toothbrush, two said it was less effective, and seven said it was equally effective. Eight said they would like to use an electrical toothbrush occasionally, four said they would like to use it regularly.

The objective appraisal of the effectiveness of the electrical toothbrush was more favorable than the subjective comments of the 12 subjects.

The most noticeable objective finding was the stimulating or massaging action of the electrical toothbrush on the gingival tissues. The

chief disadvantage of the instrument was that the pressure on the starter buttons required to activate the motor was unduly high. (The authors have been informed that this limitation has been overcome by the replacement of the former starting mechanism by a microswitch.) The instrument appeared to offer particular advantages to handicapped or disabled patients.

Collins, Edwin M., and Curtis, Glenn H. College of Medical Evangelists, Loma Linda, Calif. A preliminary report on an automatic-action electrical toothbrush. J.South.California D.A. 24:214-217 July 1961

Survey of retained roots and teeth based on 3,874 full-mouth roentgenograms

A study of 3,874 routine full-mouth roentgenograms of patients ranging in age from 11 to 61 years and over yielded the following findings concerning retained roots and teeth:

1. The incidence of retained roots was close to 20 per cent. Twice as many roots were retained in the maxilla as in the mandible. Over six times as many roots were retained in posterior regions than in anterior regions.

2. The incidence of retained roots in edentulous jaws was close to 24 per cent. The incidence of retained and embedded teeth in edentulous jaws was 2.6 per cent.

3. The over-all incidence of radiolucencies associated with retained roots was over 50 per cent. Of these retained roots, those exposed to the oral cavity were involved with radiolucent areas in 81 per cent of instances, whereas roots lying beneath the surface or completely encased in bone had radiolucent areas around them in only 20.5 per cent of instances.

4. The size of the retained root had no influence on the incidence of associated radiolucent areas.

5. There was no difference in the number of radiolucencies between roots retained in the maxilla and those in the mandible, but a noticeably higher incidence of involvement was noted in anterior regions as compared to posterior regions.

6. The incidence of retained roots of deciduous teeth was extremely small (1.2 per cent).

7. Retention of deciduous teeth occurred in 1 of every 63 patients. The deciduous tooth most frequently retained was the maxillary cuspid.

These findings emphasize the need for comprehensive roentgenographic examination of all dental patients.

Dachi, Stephen F., and Howell, Francis V. College of Dentistry, University of Kentucky Medical Center, Lexington, Kentucky. A survey of 3,874 routine full-mouth radiographs. I. A study of retained roots and teeth. Oral Surg.,Oral Med.& Oral Path. 14:916-924 Aug. 1961

Gingival health in personnel wintering in Antarctica

The relation between ascorbic acid plasma levels and gingival health was studied in 26 men exposed to the stress of wintering in Antarctica during the International Geophysical Year, 1957–1958. The experimental group was composed of 13 outdoor workers and 13 indoor workers.

Studies have shown that animals exposed to the stress of extreme cold have an increased need for ascorbic acid. Monthly ascorbic acid plasma level (AAPL) determinations on each subject were tabulated for the eleven-month period. The average individual AAPL determinations for the indoor group ranged from about 0.6 to 1.2 mg. per cent (that is, within the normal range), whereas the average individual AAPL determinations over the period for the outdoor group ranged from about 0.5 to 0.7 mg. per cent (generally accepted as low normal).

No significant differences existed in the health of the gingival tissues, as between the two groups, despite the significant difference in their ascorbic acid plasma levels.

It may be that a physiological difference in oral health existed but that the gross clinical methods used for evaluation were not adequate to reflect fine changes. It may be that since the ascorbic acid plasma levels were within the wide range of normal (between 0.50 and 1.5 mg. per cent), no difference in gingival health should be expected. It may be that the degree of oral health and ascorbic acid plasma levels are not directly related. The working environment of the two groups may have been responsible for the significant difference in ascorbic acid plasma levels.

Perlitsh, Max J., Nielsen, Arne G., and Stanmeyer, William R. Dental Branch, U.S. Naval Medical Research Laboratory, New London, Conn. Ascorbic acid plasma levels and gingival health in personnel wintering over in Antarctica. J.D.Res. 40:789-799 July-Aug. 1961

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LIST OF PERIODICALS ABSTRACTED

The periodicals from which abstracts were made and printed in Volume 6 of *Dental Abstracts* are listed below in the alphabetical order of their abbreviations. In addition the full title and address of each periodical are given.

Lists of all dental journals published in the United States and of dental journals published outside the United States and currently received in the Bureau of Library and Indexing Service of the American Dental Association are available free from that Bureau.

Abs.Japanese Med. Abstracts of Japanese Medicine. Excerpta Medica Foundation, 119-123 Herengracht, Amsterdam, The Netherlands.

Abs.Bulgarian Sci.Lit. Abstracts of Bulgarian Scientific Literature, Bulgarian Academy of Sciences, Centre of Scientific and Technical Information and Documentation, Sofia, Bulgaria.

Abs.Soviet Med. Abstracts of Soviet Medicine. Excerpta Medica Foundation, 111 Kalverstraat, Amsterdam, The Netherlands.

Acta chir.Plasticae Acta chirurgiae Plasticae. Smecky 30, Prague 2, Czechoslovakia.

Acta neurochir. Acta neurochirurgica. Springer-Verlag, Vienna, Austria.

Acta odont.scandinav. Acta Odontologica Scandinavica. 53 Nybrogatan, Stockholm Ö, Sweden.

Alpha Omegan Alpha Omegan. 329 Bloor St., West, Toronto 5, Ontario, Canada.

Am.J.Orthodont. American Journal of Orthodontics. C. V. Mosby Co., 3207 Washington Blvd., St. Louis 3, Mo.

Am.J.Pub.Health. American Journal of Public Health and the Nations Health. 374 Broadway, Albany 7, N. Y.

Am.J.Roentg. American Journal of Roentgenology, Radium Therapy and Nuclear Medicine. Charles C Thomas, 301 E. Lawrence Ave., Springfield, Ill.

Am.J.Vet.Research American Journal of Veterinary Research. American Veterinary Medical Association, 600 S. Michigan Ave., Chicago, Ill.

An.españ.odontoestomat. Anales Españoles de Odontoestomatología. Avenida de Jose Antonio 27, 8, 3, Apartado de Correos 368, Madrid, Spain.

Analyt.Chem. Analytical Chemistry. American Chemical Society, 1155 Sixteenth St., N.W., Washington 6, D. C.

Anesth.& Analg. Current Researches in Anesthesia and Analgesia. Wade Park Manor, E. 107th & Park Lane, Cleveland 6, Ohio.

Anesthesiology Anesthesiology. American Society of Anesthesiologists, 3 Penn Center Plaza, Philadelphia 2, Pa.

Anaesthesist, Berlin Der Anaesthesist. Reichpietschufer 20, Berlin W 35, Germany.

Angle Orthodont. Angle Orthodontist. Zuelke Bldg., Appleton, Wis.

Ann.chir.gynaec.Fenn. Annales chirurgiae et gynaecologiae Fenniae. Yrjönkatu 17, Helsinki, Finland.

Ann.New York Acad.Sc. Annals of the New York Academy of Sciences.

Ann.odontostomat.,Lyon Annales Odonto-Stomatologiques. 6, Place Depéret, Lyon, France.

Arch.Environ.Health Archives of Environmental Health. American Medical Association, 535 N. Dearborn St., Chicago 10, Ill.

Arch.Gen.Psychiat. Archives of General Psychiatry. American Medical Association, 535 N. Dearborn St., Chicago 10, Ill.

Arch.Int.Med. Archives of Internal Medicine. American Medical Association, 535 N. Dearborn St., Chicago 10, Ill.

Arch.Indust.Health. Archives of Industrial Health. 535 N. Dearborn St., Chicago 10, Ill.

Arch.klin.Chir. Archiv für klinische Chirurgie (combined with Deutsche Zeitschrift für Chirurgie and Langenbecks Archiv für klinische Chirurgie), Reichpietschufer 20, Berlin W 35, Germany.

Arch.Oral Biol. Archives of Oral Biology. Pergamon Press, Ltd., 4 & 5 Fitzroy Square, London W.1, England.

Arch.Otolaryng. Archives of Otolaryngology. American Medical Association, 535 N. Dearborn St., Chicago 10, Ill.

Arch.Path. Archives of Pathology. American Medical Association, 535 N. Dearborn St., Chicago 10, Ill.

Arch.Surg. Archives of Surgery. American Medical Association, 535 N. Dearborn St., Chicago 10, Ill.

Arzneimitt.Forsch. Arzneimittel-Forschung, Drug Research. Aulendorf, Württemberg, Germany.

Austral.D.J. Australian Dental Journal. 135 Macquarie St., Sydney, Australia.

Bl.Zahnhk.,Zürich Blätter für Zahnheilkunde. Stauffacherstrasse 3, Zurich, Switzerland.

Brit.D.J. The British Dental Journal. 13 Hill St., Berkeley Sq., London W.1, England.

Brit.M.J. British Medical Journal. British Medical Association, Tavistock Sq., London W.C.1, England.

Brit.D.Surg.Asst. British Dental Surgery Assistant. 2 Sumner St., London W.1, England.

Brux.-méd. Bruxelles Médical. 141 Rue Belliard, Brussels, Belgium.

Bul.Akron D.Soc. Bulletin of the Akron Dental Society. 827 Second National Bldg., Akron 8, Ohio.

Bul.Am.Col.Pathologists Bulletin of the American College of Pathologists. Prudential Plaza, Chicago 1, Ill.

Bul.Tokyo D.Col. Bulletin of Tokyo Dental College. Kanda-Misakicho, Chiyoda-ku, Tokyo, Japan.

Calif.Med. California Medicine. California Medical Association, 450 Sutter St., San Francisco, Calif.

Capital Chemist Capital Chemist. National Bureau of Standards, Washington 25, D. C.

Časop.lék.česk. Časopis Lékaru Českych. Čis. 43, Strana 1365-88, Prague 1, Czechoslovakia.

Central African J.Med. Central African Journal of Medicine. P.O. Box 2073, Salisbury, S. Rhodesia, Africa.

Českoslov.stomat. Československa stomatologie. Krakovská 8, Prague 2, Czechoslovakia.

Chicago Med. Chicago Medicine, formerly The Chicago Medical Society Bulletin, 86 Randolph Street, Chicago 1, Ill.

Chirurg Der Chirurg. Springer-Verlag, Berlin, Germany.

Chron.WHO Chronicle of the World Health Organization. Palais des Nations, Geneva, Switzerland.

CIBA Symp. CIBA Symposium. CIBA Ltd. Basel, Switzerland.

Consumer Reports Consumer Reports. Consumers Union of U.S., Inc., 256 Washington St., Mount Vernon, N. Y.

Czas.stomat. Czasopismo Stomatologiczne. Ul. Filtrowa 30, III pietro, Zaklad Protetyki, Warsaw, Poland.

D.Dienst Dental Dienst. Schillerplatz 20, Bielefeld, Germany.

D.Echo, Heidelberg Dental Echo. Turner-Strasse 20, Heidelberg, Germany.

D.Practitioner The Dental Practitioner and Dental Record. John Wright & Sons Ltd., Bath Rd., Bristol 4, England.

D.Progress Dental Progress. 1225 E. 60th St., Chicago 37, Ill.

D.Radiog.& Photog. Dental Radiography and Photography. 343 State St., Rochester 4, N. Y.

Design Design. Council of Industrial Design, 28 Haymarket, London W.S.1, England.

Deut.med.J. Deutsches Medizinisches Journal, Official Organ of the Deutscher Kongress für Ärztliche Fortbildung, Klingsorstrasse 21, Berlin-Steglitz, Germany.

Deut.med.Wschr. Deutsche Medizinische Wochenschrift. Herdweg 63, Stuttgart, Germany.

Deut.Stomat. Deutsche Stomatologie. Neue Grünstrasse 18, Berlin C 2, Germany.

Deut.Zahnärzte Kal. Deutscher Zahnärzte Kalender. Carl Hanser, Munich, Germany.

Deut.Zahnärztebl. Das Deutsche Zahnärzteblatt. Lazarettstrasse 2-6, Munich 2, Germany.

Deut.zahnärztl.Zschr. Deutsche Zahnärztliche Zeitschrift. Kolbergerstrasse 22, Munich 27, Germany.

Fort.Rev.Chicago D.Soc. Fortnightly Review of the Chicago Dental Society. 30 N. Michigan Ave., Chicago 2, Ill.

Fortschr.Kief.Ges.Chir. Fortschritte der Kiefer- und Gesichts-Chirurgie. Herdweg 63, (14a) Stuttgart N, Germany.

German M.Monthly German Medical Monthly. Georg Thieme, P.O.B. 732, Stuttgart, Germany.

Geront.Clin. Gerontologia Clinica. International Journal of Geriatrics. General Hospital, Sunderland, Durham, England.

Haematologica Haematologica, Casella Postale 149, Pavia, Italy.

Harvard D.Alumni Bul. Harvard Dental Alumni Bulletin. 188 Longwood Ave., Boston 15, Mass.

Harvard Pub.Health Alumni Bul. Harvard Public Health Alumni Bulletin. 55 Shattuck St., Boston 15, Mass.

Hautarzt. Zeitschrift für Dermatologie, Venereologie und verwandte Gebiete. Springer-Verlag, Reichpietschufer 20, Berlin W 35, Germany.

Helvet.odont.acta Helvetica Odontologica Acta. Postfach 121, Zurich 28, Switzerland.

Henry Ford Hosp.M.Bul. Henry Ford Hospital Medical Bulletin. 2799 W. Grand Blvd., Detroit 2, Mich.

Illinois D.J. Illinois Dental Journal. 632 Jefferson Bldg., Peoria 2, Ill.

Indian J.M.Sc. Indian Journal of Medical Sciences. Back-Bay View, New Queen's Rd., Bombay 4, India.

Inform.dent.,Paris L'Information Dentaire. 16, Rue Vignon, Paris 9, France.

Indust.Nurses J. Industrial Nurses Journal. American Association of Industrial Nurses, 170 E. 61st St., New York 21, N. Y.

Internat.D.J. International Dental Journal. A. Sijthoff, 37 Wagenstraat, The Hague, The Netherlands.

Internat.J.Clin.& Exper.Hypnosis International Journal of Clinical and Experimental Hypnosis. Mount Royal & Guilford Aves., Baltimore 2, Md.

Iowa D.J. The Iowa Dental Journal. 639 Insurance Exchange Bldg., Des Moines 9, Iowa.

J.A.D.A. The Journal of the American Dental Association. 222 E. Superior St., Chicago 11, Ill.

J.A.M.A. The Journal of the American Medical Association. 535 N. Dearborn St., Chicago 10, Ill.

J.All India D.A. Journal of the All-India Dental Association. Gen. Assurance Bldg., 232 Dr. Dadabhoi Nabroji Rd., Bombay 1, India.

J.Alabama D.A. Journal of the Alabama Dental Association. 1729 Springhill Ave., Mobile, Ala.

J.Am.Col.Den. Journal of the American College of Dentistry. 4236 Lindell Blvd., St. Louis 8, Mo.

J.Am.D.Hygienists'A. Journal of the American Dental Hygienists' Association. 100 E. Ohio St., Chicago 11, Ill.

J.Am.D.Soc.Anesthes. Journal of the American Dental Society of Anesthesiology. 1275 Delaware Ave., Buffalo 9, N. Y.

J.Am.Podiatry A. Journal of the American Podiatry Association. 3301 16th St., N.W., Washington 10, D. C.

J.Am.Water Works A. Journal of the American Water Works Association. 521 Fifth Ave., New York 17, N. Y.

J.California D.A.& Nevada D.Soc. Journal of the California State Dental Association and the Nevada State Dental Society. 450 Sutter St., San Francisco 8, Calif.

J.Connecticut D.A. Journal of the Connecticut State Dental Association. 37 Linnard Rd., West Hartford 7, Conn.

J.D.A.South Africa Journal of the Dental Association of South Africa. P.O. Box 3094, Cape Town, South Africa.

J.D.Educ. Journal of Dental Education. American Association of Dental Schools, 840 N. Lake Shore Drive, Chicago 11, Ill.

J.D.Med. Journal of Dental Medicine. 57 W. 57th St., New York 19, N. Y.

J.Canad.D.A. Journal of the Canadian Dental Association. 234 St. George St., Toronto 5, Ontario, Canada.

J.D.Res. Journal of Dental Research. University of Chicago Press, 5750 Ellis Ave., Chicago 37, Ill.

J.Den.Children Journal of Dentistry for Children. American Society of Dentistry for Children, 13201 Miles Ave., Cleveland 5, Ohio.

J.dent.belge Journal Dentaire Belge. 166 Chaussee D'Etterbeek, Brussels 4, Belgium.

J.Dist.Columbia D.Soc. Journal of the District of Columbia Dental Society, 1835 Eye St., N.W., Washington 6, D. C.

J.Health, Phys.Educ.& Recreat. Journal of Health, Physical Education and Recreation. 1201-16th St., N.W., Washington, D. C.

J.Hist.Med. Journal of the History of Medicine and Allied Sciences. 333 Cedar St., New Haven, Conn.

J.Histochem.& Cytochem. Journal of Histochemistry and Cytochemistry. Williams & Wilkins Co., Baltimore, Md.

J.Indian Acad.Den. Journal of the Indian Academy of Dentistry. Sir C. E. M. Dental College and Hospital, J. J. Hospitals, Byculla, Bombay 8, India.

J.Indian M.Prof. Journal of the Indian Medical Profession. A. MacRae & Co. Ltd., United India Bldg., Sir Phirozshah Mehta Road, Bombay 1, India.

J.Indiana D.A. The Journal of the Indiana State Dental Association. 1012 Hume Mansur Bldg., Indianapolis 4, Ind.

J.Kentucky D.A. Journal of the Kentucky Dental Association. 2208 Dundee Road, Louisville 5, Ky.

J.Michigan D.A. The Journal of the Michigan State Dental Association. 112 E. Allegan, Lansing, Mich.

J.Missouri D.A. The Journal of the Missouri State Dental Association. 201 Merchants Bank Bldg., Jefferson City, Mo.

J.N.Carolina D.Soc. The Journal of the North Carolina Dental Society. P. O. Box 11065, Raleigh, N. C.

J.Nat.M.A. Journal of the National Medical Association. 1219 Girard St., N.W., Washington 9, D. C.

J.Nihon Univ.School Den. Journal of Nihon University School of Dentistry. Surugadai, Chiyoda-ku, Tokyo, Japan.

J.Ontario D.A. Journal of the Ontario Dental Association. 230 George St., Toronto, Ontario, Canada.

J.Oral Surg.,Anesth.& Hosp.D.Serv. Journal of Oral Surgery, Anesthesiology and Hospital Dental Service. Formerly Journal of Oral Surgery. 222 E. Superior St., Chicago 11, Ill.

J.Periodont. Journal of Periodontology. 1121 W. Michigan St., Indianapolis 2, Ind.

J.Pharm.Sc. Journal of Pharmaceutical Sciences. American Pharmaceutical Association, 2215 Constitution Ave., N.W., Washington 7, D. C.

J.Philippine D.A. Journal of the Philippine Dental Association. 631 Quezon Blvd., Manila, Philippines.

J.Pros.Den. The Journal of Prosthetic Dentistry. C. V. Mosby Co., 3207 Washington Blvd., St. Louis 3, Mo.

J.School Health Journal of School Health. American School Health Association, 515 E. Main St., Kent, Ohio.

J.South.California D.A. Journal of the Southern California State Dental Association. 903 Crenshaw Blvd., Los Angeles 19, Calif.

J.Tennessee D.A. Journal of the Tennessee State Dental Association. 210 Twenty-third Ave. N., Nashville 5, Tenn.

J.Wisconsin D.Soc. The Journal of the Wisconsin State Dental Society. 704 W. Wisconsin Ave., Milwaukee 3, Wis.

Klin.Wschr. Klinische Wochenschrift, Reichpietschufer 20, Berlin W 35, Germany.

Lancet Lancet. 7 Adam St., Adelphi, London W.C. 2, England.

M.J.Australia Medical Journal of Australia. Australasion Medical Publishing Co. Ltd., Seamer St., Glebe, Sydney, N.S.W., Australia.

M.J.Osaka Univ. Medical Journal, Osaka University. 33 Joancho, Kitaku, Osaka, Japan.

M.Letter on Drugs & Therapeut. Medical Letter on Drugs and Therapeutics. Drug and Therapeutic Information, 305 E. 45th St., New York 17, N. Y.

M.Mundi Medicamundi, Quarterly Journal on Medical Science. Eindhoven, The Netherlands.

Massachusetts D.Soc.J. Massachusetts Dental Society Journal. 227 Commonwealth Ave., Boston 16, Mass.

Med.Klin. Medizinische Klinik. Urban & Schwarzenberg, Munich 15, Germany.

Med.Welt Medizinische Welt, Schloss Strasse 20, Stuttgart 1, Germany.

Meded.med.Prodent Res. Mededelingen Medinos Prodent Research. Amersfoort, The Netherlands.

Midwest Den. Midwestern Dentist. 6314 Brookside Plaza, Kansas City, Mo.

Minerva stomat. Minerva Stomatologica. Corso Bramante 83-85, Turin 314, Italy.

Mil.Med. Military Medicine. Suite 718, New Medical Bldg., 1726 Eye St., N.W., Washington, D.C.

Monde dent. Le monde dentaire. 7000 Avenue du Parc, Montral, Quebeck, Canada.

Mschr.Ohrenhk. Monatsschrift für Ohrenheilkunde und Laryngo-Rhinologie. Frankgasse 4, Vienna 9, Austria.

München.med.Wschr. Münchener Medizinische Wochenschrift. Paul Heyse Strasse 26, Munich 15, Germany.

Nature Nature. Macmillan & Co., Ltd., St. Martin's St., London W.C.2, England.

Naturwissenschaften Die Naturwissenschaften. Jennerstrasse 21, 20b Göttingen, Germany.

Nederlands Tandarts. Nederlands Tandartsenblad. Prins Hendrikklaan 16, Zeist, The Netherlands.

New England J.Med. The New England Journal of Medicine. 8 Fenway, Boston 15, Mass.

New Mexico D.J. New Mexico State Dental Journal. 113 Girard Blvd., S.E., Albuquerque, N. Mex.

New Scientist The New Scientist. Cromwell House, Fulwood Place, High Holborn, London W.C.1, England.

New York J.Den. The New York Journal of Dentistry. 499 Lincoln Pl., Brooklyn 38, N. Y.

New York State D.J. New York State Dental Journal. Room 219, 268 Ashland Place, Brooklyn 17, N. Y.

New Zealand D.J. New Zealand Dental Journal. Lister Bldg., Victoria St. E., Auckland C.1, New Zealand.

North-West Den. North-west Dentistry. 2642 University Ave., St. Paul 14, Minn.

Northwest.Univ.Bul. Northwestern University Bulletin. 309 E. Chicago Ave., Chicago 11, Ill.

Nutrit.Rev. Nutrition Reviews. 99 Park Ave., New York 16, N. Y.

Odont.Chilena Odontología Chilena. Casilla 8031, Santiago, Chile.

Odont.Revy Odontologisk Revy. Stortorget 6, Lund, Sweden.

Odont.Tskr. Odontologisk Tidskrift. Erik Dahlbergsgatan 9, Göteborg C., Sweden.

Oral Surg.,Oral Med.& Oral Path. Oral Surgery, Oral Medicine and Oral Pathology. C. V. Mosby Co., 3207 Washington Blvd., St. Louis 3, Mo.

Oregon D.J. Oregon State Dental Journal. 3245 N.E. Schuyler St., Portland 12, Ore.

Österr.Dent.Zschr. Österreichische Dentisten Zeitschrift. Wiedner Hauptstrasse 12, Vienna 4, Austria.

Panminerva med. Panminerva Medica. The Journal of the Italian Medical Association. Corso Bramante 83-85. Turin, Italy.

Parodontol.,Zürich Parodontologie. Imprimerie Berichthaus. Zwingliplatz 3, Zurich, Switzerland.

Pennsylvania D.J. Pennsylvania Dental Journal. 217 State St., Harrisburg, Pa.

Plast.& Reconstr.Surg. Plastic & Reconstructive Surgery. Williams & Wilkins Co., Mt. Royal & Guilford Aves., Baltimore 2, Md.

Polish M.Hist.& Sc.Bul. Polish Medical History and Science Bulletin. Polish Medical Alliance, 2424 N. Kedzie Blvd., Chicago 47, Ill.

Proc.Intern.Congr.Electronmicrosc. Proceedings of the International Congress of Electron Microscopy (Vierter Internationaler Kongress für Elektronenmikroskopie). Reichpietschufer 20, Berlin W 35, Germany.

Proc.Mayo Clin. Proceedings of the Staff Meetings of the Mayo Clinic. Rochester, Minn.

Proc.Roy.Soc.Med. Proceedings of the Royal Society of Medicine. 1 Wimpole St., London W. 1, England.

Pub.Health Den. Public Health Dentistry. 84 Holland Ave., Albany, N. Y.

Pub.Health Rep. Public Health Reports. Public Health Service, Health, Education, and Welfare Bldg., Washington 25, D. C.

Quart.Nat.D.A. Quarterly of the National Dental Association. P.O. Drawer 0, Tuskegee Institute, Ala.

Quintessenz Die Quintessenz der zahnärztlichen Literatur. Stallupöner Allee 18, Berlin-Charlottenburg, Germany.

Rass.internaz.clin.ter. Rassegna internazionale di clinica e terapia. Via S. Sebastiano 65, Naples, Italy.

Rass.odontotec. Rassegna odontotecnica. Via Copernico 8, Milan, Italy.

Rev.A.odont.,Argentina Revista de la Asociación Odontológica Argentina. Junin 959, Buenos Aires, Argentina.

Rev.A.Paul.Cir.Dent. Revista da Associacao Paulists da Cirurgioes Dentistas. Avenida São João 126-Sôbre-Loja, Caixa Postal 2523, São Paulo, Brazil.

Rev.belge stomat. Revue Belge de Stomatologie. 8 Place Foch, Louvain, Belgium.

Rev.dent.Chile Revista Dental de Chile. Casilla 2575, Santiago de Chile, Chile.

Rev.mens.suisse odont. Revue mensuelle suisse d'Odontologie. Buchdruckerei Berichthaus, Zurich, Switzerland.

Rev.stomat.,Paris Revue de Stomatologie. Librairie Masson & Cie., 120, Boulevard Saint-Germain, Paris 6, France.

Riv.ital.Stomat. Rivista Italiana di Stomatologia. Calle Ballotte 4866, Venice, Italy.

Schweiz.Arch.Tierhk. Schweizer Archiv für Tierheilkunde. Dietzingerstrasse 3, Zurich, Switzerland.

Schweiz.med.Wschr. Schweizerische Medizinische Wochenschrift. B. Schwabe & Co., Basel, Switzerland.

Schweiz.Mschr.Zahnhk. Schweizerische Monatsschrift für Zahnheilkunde. Buchdruckerei Berichthaus, Zurich, Switzerland.

Science Science. 1515 Massachusetts Ave., N.W., Washington 5, D. C.

Scient.Am. Scientific American. 2 W. 45th St., New York 36, N. Y.

Shikwa Gakuho Shikwa Gakuho. Tokyo Dental School, No. 17, Kanda-Misakicho, Chiyodaku, Tokyo, Japan.

South African M.J. South African Medical Journal. P.O. Box 643, Cape Town, South Africa.

SSO Société de Odontologie (SSO) Bulletin für Standesfragen. 8 Rue St. Léger, Geneva, Switzerland.

Stain Tech. Stain Technology. Mount Royal and Guilford Aves., Baltimore 2, Md.

Stoma Stoma, Zeitschrift für die wissenschaftliche Zahn-, Mund- und Kieferheilkunde. Wilckenstrasse 3, Heidelberg, Germany.

Stomat.Glasnik Srbije Stomatološki Glasnik Srbije (Stomatological Review of Serbia). Rankeova 4, Belgrade, Yugoslavia.

Stomat., Moscow Stomatologiia. Medghis, Petrovka 12, Moscow, U.S.S.R.

Stomat.,Sofia Stomatologija. Nauka i Izkustvo 5, Sofia, Bulgaria.

Suomen hammaslääk.toim. Suomen Hammaslääkäriseuran Toimituksia. Bulevardi 30 B., Helsinki, Finland.

Svensk.Läk.Tidn. Svenska Lakartidningen. Villagatan 5, Stockholm, Sweden.

Svensk.tandläk.Tskr. Svensk Tandläkare-Tidskrift. Nybrogatan 53, Stockholm, Sweden.

Sveriges tandläk.Tidn. Sveriges Tandläkarförbunds Tidning. Nybrogatan 53, Stockholm, Sweden.

Surg.Gynec.& Obst. Surgery, Gynecology and Obstetrics. Franklin H. Martin Memorial Foundation, 54 E. Erie St., Chicago 11, Ill.

Tandlaegebl. Tandlaegebladet. Osterbrogade 4, Copenhagen, Denmark.

Texas D.J. Texas Dental Journal. 3707 Gaston Ave., Dallas 10, Texas.

Texas J.Med. Texas State Journal of Medicine. 1801 N. Lamar Blvd., Austin, Texas.

Today's Health Today's Health. American Medical Association, 535 N. Dearborn St., Chicago 10, Ill.

Tr.Roy.School Den. Transactions of the Royal Schools of Dentistry. Umeå Research Library, Umeå, Sweden.

Trib.odont., Buenos Aires. La tribuna odontologica. Casilla de Correos 2047, Buenos Aires, Argentina.

Tschr.tandheelk. Tijdschrift voor Tandheelkunde. Jutfaseweg 1, Utrecht, The Netherlands.

U.S.Armed Forces M.J. U.S.Armed Forces Medical Journal. 23rd & E Sts., N.W., Washington 25, D. C.

U.S.Navy M.Newsletter United States Navy Medical Newsletter. Department of the Navy, Bureau of Medicine and Surgery, Washington 25, D. C.

Ugeskr.laeg. Ugeskrift for Laeger, Almindelige Danske Laegeforening, Kristianiagade 12, Copenhagen ø, Denmark.

W.S.Kellogg Foundation Rep. for 1960 W. S. Kellogg Foundation Report for 1960. Battle Creek, Mich.

Zahnärztl.Praxis Zahnärztliche Praxis. Hans Cornelius Strasse 4, München-Gräfelfing, Germany.

Zahnärztl.Rundschau Zahnärztliche Rundschau. Fasanenstrasse 61, Berlin W 15, Germany.

Zahnärztl.Welt & Reform Zahnärztliche Welt und Zahnärztliche Reform. Wilckenstrasse 3, Heidelberg, Germany.

Zbl.Bakt.I.Orig. Zentralblatt für Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene, I. Abteilung Medizinisch-hygienische Virusforschung, Originale. Eberhardstrasse 10, Stuttgart 5, Germany.

Zbl.Chir. Zentralblatt für Chirurgie. Salomonstr. 18B, Leipzig C 1, Germany.

Zobozdrov.vest. Zobozdrovstveni Vestnik. Lipičeva 1, Ljubljana, Yugoslavia.

Zschr.Kinderpsychiat. Zeitschrift für Kinderpsychiatrie. Steintorstrasse 13, Basel 10, Switzerland.